Oasys
LS-DYNA Environment

Update and Release Notes for the Oasys Ltd LS-DYNA Environment Software

Version 22.0

Contents

1 Introduction

The Oasys Ltd LS-DYNA Environment 22.0 suite, dated Jun 2025, 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 21.1). 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 Ansys LS-DYNA® releases

The 22.0 release has been used and tested with Ansys LS-DYNA version R15. It supports all the keywords in volumes I, II and III of the released R15.0 User’s Manual (except ISPG). Some of the new keywords in the development R16 User’s Manual are also supported.

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

1.2 Hardware platforms supported

Oasys Ltd LS-DYNA Environment 22.0 is available on the following platforms:

Windows	Windows 11	64 bit
Linux	RedHat Enterprise 8.x	64 bit

For Windows, v22.0 is built and tested on Windows 11. It should work on Windows 10, but this is untested. Windows 10 goes end-of-life in October 2025, so you are encouraged to upgrade to Windows 11 if you currently use Windows 10. The software may also run on Windows 8.1, but this is untested. It will not run on Windows versions prior to that because of changes in the way Microsoft configure displays.

For Linux, the RedHat Enterprise 8.x build has been released on the website as this has been found to run on all the Linux machines we have tested (RHEL 8, SuSE 15.2). If you require a different Linux build, please contact Support.

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. Please contact Support for more information.

1.4 Licensing

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

To ensure you are ready to enjoy all the great features v22.0 will bring, we recommend you update all your Oasys Suite license servers and files as soon as possible.

Note that Oasys 22.0 will be the last release for our server licencing package on RHE7, due to its end of life.

Action to take

If you are using a floating network license, you will need to install the LM-X license server software (version 5.6.4). The software and supporting documentation are available to download from our website and are also included in our installation packages.

Backwards compatibility

The Oasys Suite 22.0 LM-X license file and license daemons are backwards compatible for all currently supported versions of Oasys Suite. This means that any existing 21.x, 20.x, and 19.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

Attached

- **Case 56194**

The Contact option on find attached was not working correctly. Propagation from selected Part to (sliding) Contact is now conditional on this setting.

Batteries

- **Case 55734**

Battery setup tool: SOCTOU, R0, R10, C10 etc. fields in the ‘4. Randles parameters’ panel can now also be set to type *DEFINE_TABLE which was not previously supported.

- **Case 55733**

Battery setup tool: R10 and C10 buttons in the ‘4. Randles Parameters’ panel were being mapped in the ‘Randles circuit charge/discharge properties’ section for RDLTYPE=0-order but they should not since only R0 is required for this configuration. This has been fixed.

Belts

- **Case 55993**

The ‘Custom’ option for preset seatbelt mesh density is no longer visible in the dropdown menu. Instead, it will only appear in the textbox when a non-default value is chosen.

- **Case 55473**

PRIMER checks *MAT_SEATBELT to see if any seatbelt elements have a length that is less than 1.6 * LMIN. This check included seatbelts ‘inside’ the retractor which, by definition, have zero length so it gave false errors. It now ignores these elements.

- **Case 54734**

For slipring rotations the << arrow button was not functioning as expected. This has been fixed and now slipring rotations reset when resetting the fitted belt using the << button.

- **Case 51399**

Updated Warning for SECTION EDGESET, a warning will now be issued if the Part ID of any EDGESET node does not match the Part ID of the Section card. This warning will only appear if any of the nodes are not owned by any of the Parts that own the section.

Boundary

- **Case 55766**

The *BOUNDARY_FLUX keyword was read incorrectly in PRIMER, being treated as an open-ended keyword terminated at the next *keyword line rather than a finite keyword with #lines determined by data field NHISV.

In most situations when written with a fresh *BOUNDARY_FLUX header for each keyword, this would not have mattered, but when multiple definitions followed the initial header, the second and subsequent ones would have been omitted.

Now fixed by applying the correct logic during model read.

Case

- **Case 53532**

PRIMER tests for attempts to open duplicate editing panels on a given keyword, making the second and subsequent sessions ‘browse’ (i.e. read only) to avoid conflicts arising from updating the keyword from multiple locations.

This logic did not work correctly for the CASE management panel in some rare situations, this is now fixed.

Checking

- **Case 55692**

The check for overlapping contact definitions did not detect the case where the contact was defined by part/part-set/shell-set and elements on different sides shared common nodes. These are now reported as errors.

- **Case 55580**

Checking *CONTROL_EXPLICIT_THERMAL_INITIAL no longer causes a crash.

Clipboard

- **Case 55626**

‘Find referenced items’ on Clipboard will find parameters, but when de-selected, these were still copied to the new model or written to the keyword file. If deselected, the *PARAMETER is now suppressed and latent parameters written to the keyword file.

- **Case 55525**

Cleanup unused failed to remove unattached joints if JSTF was defined. Corrected to remove JSTF too.

Connections

- **Case 56053**

Refreshing the connection table when the connections have been externally deleted would result in a crash. Now fixed.

- **Case 55945**

A spurious connection error that the weld node was some enormous distance away from the segment (3e32!) was observed when the node was obviously on the segment. This was due to an uninitialised variable - now fixed.

- **Case 55890**

The Simplify option is on for bolts by default. In this mode, PRIMER omits the empty lead rigid part. This now also applies for NRB bolts that have converted to C_EXTRA_NODE to attach to rigid panels.

- **Case 54646**

In PRIMER 21.0, the nugget diameter for beam welds was 5mm by default. The nugget diameter for beam welds now corresponds to TS1.

Contacts

- **Case 56323**

The contact parameter SLDTHK is now ignored for tied contacts, it was wrongly affecting PENCHECK. The default thickness for solids being zero.

- **Case 55814**

The pick & propagate function in the contact crossed edge fixer has been improved. Previously, a crossed edge closed at both ends was required to determine the nodes on the same side as the picked node. The process failed when the crossed edge was closed by free edge. This has been fixed.

- **Case 55254**

Resolved the bug where contact surfaces were invisible for the second model in the same session.

Contour

- **Case 56031**

‘Disable discrete contouring’ (on SETTINGS panels)/‘Disable discrete contours’ (on LEVELS panel) option:

- When contour or vector plots were updated, the availability of this option on opened contour & vector plot SETTINGS or LEVELS panels were not updated appropriately.
- The option will now be disabled/enabled appropriately on any opened SETTINGS or LEVELS panels.

Nodal Mass vector plot SETTINGS panel:

- The ‘Disable discrete contouring’ option was not working properly.
- The option can now be correctly checked/unchecked.

Copy

- **Case 55475**

In the CREATE/MODIFY DEFINE_FUNCTION panel, ‘Copy In’ now successfully copies the selected *DEFINE_FUNCTION entity.

Crash Test Setup

- **Case 55715**

The Batch Crash Test Setup tool will now write all the newly created keywords to the Master file.

- **Case 53854**

The tool now supports barriers that have a *INCLUDE file structure. In past versions, barriers had to be a stored in a single master file, but now, barriers with the *INCLUDE keyword are also supported.

Cut section

- **Case 56411**

On the cut section custom spacing panel, the position showing 0.0 for the local cut origin is disabled. In some cases, another plane position was disabled instead of this. This could happen when there are two positions on the panel, where the first was positive and the second is 0.0, i.e. when the positions are not sorted after editing, then the number of planes was increased. In this situation, negative values are added to the end of the list. After clicking ‘Sort positions’, the first position with a negative value was disabled instead of 0.0.

Additionally, the cut planes did not update on the screen correctly.

Both problems have now been fixed.

- **Case 56246**

When there was a cut section defined in D3PLOT and the cutting switch was turned on or off there, the graphics in a linked PRIMER session did not update as expected. This has been fixed.

- **Case 55561**

Cut-section true-thickness capping did not update for thin shells when thickness was updated from *SECTION_SHELL. This has now been fixed.

- **Case 54177**

When a cut plane is close to the plane of the screen, sometimes, the mouse needed to move quite far to achieve a relatively small visible change when the plane was dragged. Now, the plane

origin is moved such that its projection on the screen plane corresponds to the mouse movement. This can mean relatively large plane changes normal to the screen, but this seems more intuitive.

When the plane is exactly the plane of the screen, the behaviour is still determined by UP/RIGHT for the positive direction and DOWN/LEFT for the negative direction.

Damping

- **Case 55266**

Data in curve editors invoked from *DAMPING_GLOBAL editors no longer get confused when reading a curve from a different model when two models in the same session share the same curve LCIDs.

Database

- **Case 56299**

Empty part-set check for *DATABASE_BINARY_D3PLOT was giving a warning for PSETID even when it is defined. This has been corrected.

- **Case 56178**

Corrected typo in *DATABASE_BINARY_RUNRSF field name from ‘NEWRSF’ to ‘NR’ in card 1.

Dummies

- **Case 56050**

The encrypted HBM tree includes can now be written out directly from the Include tree menus.

- **Case 55640**

The THUMS HBM muscle activation parameters were not getting correctly updated while creating the Ansys LS-DYNA ready positioned model in PRIMER. Fixed this.

- **Case 55041**

For some LSTC dummy models, the H-point was defined with a local coordinate system. Previously, the ‘Convert LSTC dummy’ script would not use these values, and the H-point would be incorrect in PRIMER. The script now gives the option to use the local coordinate system instead for the H-point on a dummy.

Edit

- **Case 56114**

The Wordpad editor has been removed from version 24H2 of Windows 11, as of October 2024.

Historically, Text Edit in PRIMER on Windows has used Wordpad if a user-defined editor is not specified, and if it is not found on the system, it drops back to Notepad. This functionality ceased to work on Windows 11 systems when the registry entry for that executable was not a simple pathname.

This has been fixed, and Notepad now works on Windows 11.

(If you wish to revert to using Wordpad, you will need to re-install it on your system.)

- **Case 55933**

If a *SET_xxx_COLLECT definition was edited via Text Edit from an editing panel, this would corrupt the set definition when the as-edited file was read back into the model.

In addition, using the global Text Edit tool button to edit *SET cards of any type would not work. Nothing would happen.

The first problem was due to the special way *SET_xxx_COLLECT inside PRIMER is split into child sets, the *SET definitions in the keyword file, and a parent set that exists only inside PRIMER. When rereading from the as-edited file, the special actions to resolve the labels of these, required to connect child with parent, were omitted, leading to internal confusion.

The second problem was a more general failure to consider how *SET keywords should be processed in the context of global Text edit, resulting in the individual sets not being flagged for processing.

Both problems are now fixed.

- **Case 55536**

PRIMER reads *DEFINE_FUNCTION as a string and will therefore not trap tabs on keyin. The edit panel, however, does not work well with tabs, so these are now replaced by a single space as the keyword is loaded.

- **Case 54527**

The editing panel for *DEFINE_SD_ORIENTATION had field widths that were too narrow for the contents, and this keyword had no ‘keyword’ editor.

Fixed the width problem and also added a keyword editor panel.

Element Quality

- **Case 56272**

The Jacobian reported in the element quality checks was wrong for the following cases:

- Tetrahedral solids should have reported 1.0.
- Thick shell trias reported the wrong value due to being treated as degenerate hexa elements.
- Cohesive solid penta elements, numbered like thick shell trias, also gave the wrong values.

All corrected now.

Elements

- **Case 54661**

The Interpolate Thickness option in the Forming tool has been added to interpolate shell thicknesses at the nodes from the matched shells in the source model, enhancing the accuracy of shell thickness mapping.

Encryption

- **Case 55529**

*AIRBAG encryption now works with airbags with id but no titles.

Error Trapping

- **Case 55607**

When a *DEFINE_TRANSFORMATION which uses nodes is used (types POS6N, ROTATE3NA, TRANSL2ND), Ansys LS-DYNA requires that these nodes be read before they are used. This can cause problems if such a transformation is used to read a *INCLUDE_TRANSFORM file and some of the nodes are defined in that file.

Because of the way it reads *INCLUDE_TRANSFORM (read file, then transform it), PRIMER can handle this situation and does not see it as an error. However, Ansys LS-DYNA performs the transformation earlier, before it has read the file, therefore, it will treat this as an error.

To deal with this, the error checking in PRIMER has been extended to detect this out of order problem and report it as an error during Model Check.

Geometry

- **Case 55986**

In PRIMER 21.1, after reading CAD data (e.g. via STEP, IGES, etc.), PRIMER’s automatic processing of some trim curves could result in some unnecessary unattached *GEOMETRY_POINTs. This has now been corrected such that these unnecessary points are removed from the model.

- **Case 55064**

IGES files with nested subfigures did not read correctly. Now fixed.

- **Case 51743**

Previously, when reading an IGES/STEP file, conic surfaces could be rendered incorrectly. This has now been fixed.

Graphics

- **Case 55593**

In rare situations, [View] Locate Target and Eye could cause an endless loop and crash PRIMER. This could happen if the ‘up’ vector was being calculated automatically and the vector

defined from eye to target was exactly collinear with the existing ‘up’ vector (screen Y axis) being used. Changing the current view to anything different before the target and eye operation, or choosing an up vector manually, would avoid the problem.

Now fixed in PRIMER 22.0. This collinearity is detected and an alternative calculation for the up vector is used instead.

- **Case 54804**

The PRIMER graphics would sometimes go awry previously if the bounds for a model (or multiple models) are quite large (coordinate sizes order of 1E10). This is fixed now.

- **Case 53307**

PRIMER autoscale was not taking True flat in Shells into account. This has been fixed.

- **Case 44056**

Once we change the background colour using the popup in Display → Colour, resetting the PRIMER preferences did not visually update the graphics background colour. This has now been fixed.

Help

- **Case 55253**

Launching the help manual page from the Display Contact Colours panel resulted in a ‘Topic not found’ error page in the web browser. This has been fixed.

IPP

- **Case 55827**

Previously, PRIMER could crash when writing out the IPP model with a user-defined impactor. This issue has now been fixed.

- **Case 55251**

When changing to the FMVSS201 option, the default settings would not change. We have now added default values for FMVSS201. Now, when changing the regulation, you have the option to change the default values to match the regulation selected.

- **Case 54584**

We have made user interface changes for the IPP options to match the regulation. Previously, the IPP tool would rotate the head when there was any angular difference. Now, if ECE R21 is selected, it only rotates if the angle is greater than 5 degrees.

IGA

- **Case 51484**

Previously, when reading CAD models into PRIMER (e.g. STEP, IGES), some surfaces may have failed to render correctly or not at all. This, in some cases, could have been due to PRIMER

ignoring parametric trim curves for rendering purposes. This has now been fixed such that PRIMER makes use of parametric trim curves when rendering CAD surfaces.

Include Transform

- **Case 54643**

PRIMER would skip *INCLUDE_TRANSFORM definitions when reading a model if the transformation data was missing (i.e. there was only a filename). Now, PRIMER also gives an error message when this happens.

Integration

- **Case 55915**

PRIMER did not recognise '.d3plot' files in the directory when the D3PLOT link button was clicked, displaying the 'Find Results' button instead of 'Start D3PLOT'. This is now fixed.

- **Case 54043**

In previous versions, dynamic rotations performed in D3PLOT could cause the corresponding view in a linked PRIMER session to flicker in scenarios involving multiple D3PLOT models loaded into the same window(s). This issue has now been fixed.

JavaScript API

- **Case 56390**

Some links in the JavaScript API PDF manual were re-directing to a different program when different functions with the same name were present in more than one program (e.g. the PRIMER Node class BlankAll function was re-directing to the D3PLOT Node class BlankAll function). Issue now fixed.

- **Case 56132**

Previously for some monitors running with a particular resolution windows mapped from Window.Message, Window.Question etc. could come up too small with scrollbars. This is now fixed.

- **Case 56077**

Previously, if an error occurred in a JavaScript while processing the onClick function of a Widget in a PopupWindow, the error would not be handled correctly and PRIMER would not process button clicks in the JavaScript Window, including the Dismiss button. This has now been fixed.

- **Case 55932**

Support for custom JavaScript checks has been added to the HexSpotweldAssembly JavaScript API class.

- **Case 55900**

The JavaScript debugger could crash if you right clicked in the empty bottom left breakpoints section. This has been fixed.

- **Case 55897**

The GetComments method for parts, nodes etc. would crash PRIMER if the entity did not have any comments. This has been fixed.

- **Case 55742**

The thickness property (thick) for InterpolationSpotweld was not working in the JavaScript and Python APIs. This has been fixed.

- **Case 55376**

The JavaScript related exception thrown by PRIMER was returning the wrong function names for where the exception occurred. This has been fixed.

- **Case 55272**

The radio button widget in the GUI Builder no longer allows you to set the text property (which was not used anyway). Issue fixed.

- **Case 55067**

Giving an invalid input while setting a property, does not reset other properties in that class now. Issue fixed.

- **Case 54931**

Resolved the issue where variables returning null during debugging of the JavaScript API script were incorrectly displayed as '! invalid !' in Quick Watch.

- **Case 54629**

The order of the logic for finding scripts/modules has been changed to allow user-specified locations to override install locations. Issue fixed. Please refer to the PRIMER manual for details.

- **Case 54249**

The find attached tool has been revised so options work more consistently. For example, if the beam entity switch is off, beams will not appear even if 'Tied contacts' is on and the beams are tied. Issue fixed.

- **Case 53690**

Previously, when running a child script with a shared runtime with its parent script, PRIMER could potentially crash if the parent script was closed before the child script finished. This has now been fixed.

- **Case 51231**

The Model ImportInclude method did not work correctly when importing include file 0 (the master include file) from another model. This has been fixed.

- **Case 48968**

When adding segment sets to a *SET_SEGMENT_ADD card using API ADD(), an exception that only applied to the *SET_SEGMENT case was thrown. This is now fixed.

Keyword

- **Case 56506**

PRIMER crashed when running a check while creating an empty *ALE_AMBIENT_HYDROSTATIC. This has been fixed.

- **Case 56288**

When PARM3 had been defined as CID for discrete beam, PRIMER did not allow the input of zero. The previous value re-appeared on update. Zero is now permitted. Issue fixed.

- **Case 55590**

Absolute/Relative Include file path options were disabled for the *INCLUDE_STAMPED keyword. Fixed this.

- **Case 55576**

PRIMER could incorrectly assign label zero to *INCLUDE_STAMPED_PART_SOLID_TO_SOLID in the keyword editor. Fixed this.

- **Case 55540**

PRIMER used to write out the header only once for the *DEFINE_FILTER keyword definition, which causes an error in the Ansys LS-DYNA run. This has now been fixed to write out the header for every *DEFINE_FILTER keyword definition.

- **Case 55375**

PRIMER wrote out the *ICFD_BOUNDARY_FSI_EXCLUDE keyword for versions earlier than R11. However, the correct versions to write out are R12 and above. This has been corrected.

- **Case 55372**

Fixed a bug in the reading and editing of *EM_RANDLES_MESHLESS where the float fields TEMP and TAU were being rounded, not allowing any decimals.

- **Case 54777**

Initially, when writing out a key file including multiple *MESH_SIZE_SHAPE cards, PRIMER wrote all cards under one keyword header *MESH_SIZE_SHAPE. Now the header *MESH_SIZE_SHAPE is written out for each card.

- **Case 54260**

Fixed the bug where changing METHOD to 1 in *MESH_SIZE_SHAPE did not update card 2 properly sometimes.

- **Case 54120**

Fixed the bug where model modified showed differences in *DAMPING_FREQUENCY_RANGE even though there are none. This happened when we created a card with option 1, gave a non-zero value for the PIDREF field, changed the option to DEFORM, then write out the model. Now, model modified between the original and the written-out file/model will no longer give a difference when there are none.

- **Case 53148**

When the Ansys LS-DYNA R14 *CONSTRAINED_RIGID_BODY_SET keyword is written out for older versions of Ansys LS-DYNA, the definition is now written as multiple *CONSTRAINED_RIGID_BODYs instead. Issue fixed.

Keyword Editor

- **Case 53902**

Fixed a bug in the *EM_ISOPOTENTIAL keyword where the field ‘SETID’ only accepted the IDs of *SET_NODEs. Now, it can take the IDs of *SET_SEGMENT or *SET_NODE or *MESH_PART based on the value of the field ‘SETTYPE’. Issue fixed.

Load Paths

- **Case 55542**

Fixed a bug that was causing PRIMER to read in white space following a *LOAD_PATH card as an extra NULL *DATABASE_CROSS_SECTION instance added to the list in the load path definition during keyin.

MPP

- **Case 55022**

Decomposition ‘Show Assembly’ was not working if SET PART TREE is selected. When clicking ‘Show Assembly’ in the decomposition panel when the option SET PART TREE was selected in the Part tree popup, the Part Tree panel with the Assembly option will now be mapped as expected.

Macro

- **Case 55925**

Fixed missing and erroneous macro command tags for SOLVER and ITS popup buttons respectively in the Create/Edit panels for *SET keywords.

Manual

- **Case 55650**

Corrected the example of DialogueInput: DialogueInput(‘/re dk model_1.key 1’, ‘/re dk model_2.key 2’) under the Global class in the PRIMER JavaScript API Manual to

DialogueInput(‘/rea dk model_1.key 1’, ‘/rea dk model_2.key 2’) since the READ command requires at least three characters for abbreviation. The first two letters (/re) overlap with the RENUMBER command.

- **Case 54820**

Web links pointing to ‘Assemblies’, ‘Points’, ‘Stretch’ and ‘Applying motion to Database Cross Sections’ of the ‘Tools’ → ‘DUMMIES: Positioning Occupants’ → ‘Creating and Editing Dummies’ page in the PRIMER Manual have been changed since they were initially not pointing to the right webpages.

Mass

- **Case 55546**

When a model contained masses in include A attached to elements of include B, the mass property calculation by include (either by the massprop tool or by JavaScript) gave unreliable results when run in threaded mode. With threading switched off, it worked correctly. This is now fixed.

Materials

- **Case 56179**

For *MAT_275, corrected the typo of field name from ‘B’ to ‘K’ in card 1.

- **Case 55895**

The material section listing function was found to crash when a title contained ‘%’. This character is now supported.

Measure

- **Case 53904**

When clicking the ‘Unit Vector’ check button in the Node-to-Node measure panel, it will now refresh and update the content of the panel accordingly.

Mechanism

- **Case 53745**

In mechanisms with a coupler between one translation and one rotation, the positioning could be very slow when one of the connections is moved. In these cases, scaling the model length units may have changed the drag sensitivity. For mechanisms with one such coupler, the dragging behaviour has now been improved and is now independent of the length units.

Memory

- **Case 53599**

Contact penetration checking in PRIMER is parallelised for speed, but one consequence of this was a tendency for memory consumption to increase each time a penetration check was performed because memory was not recycled efficiently across multiple parallel threads.

The logic used to allocate, recover and redistribute memory has been rewritten to improve the efficiency with which it is used in parallel coding. There may be a small memory increase when a penetration check is performed the first few times, but this should now settle down so that repeated checks of the same contact should not continue to consume further memory.

Menus

- **Case 55971**

Added simple condition to the HIC tool to test whether a file exists and prompt you to confirm it's ok to overwrite when it does.

- **Case 55223**

On Windows, any PRIMER child windows that are dragged out onto the desktop appear as mini preview windows when you hover over the [Pr] icon on the Windows taskbar. Each preview has an 'X' which if clicked on will close the window in question.

This went wrong in two ways:

(1) 'Always there' windows such as the Part Tree in PRIMER disappeared and could not be re-instated, the dialogue box and graphics windows suffered the same fate.

(2) In some cases, the fact that the window was no longer there could cause a crash when PRIMER tried to use it because it did not 'know' that the window had been deleted.

These are now fixed. 'Always there' windows will now be removed from the desktop by remapping them inside the PRIMER master window, so they are moved rather than deleted. Windows which can be deleted legitimately, for example an editing panel, are now deleted in a way which PRIMER 'knows about' so there are no internal inconsistencies.

Mesh

- **Case 55605**

The logic in the algorithm to add a hole to a mesh has been improved to fix an issue where PRIMER could occasionally crash.

- **Case 54003**

The Ruled Mesh panel now allows for discrete and continuous line selection options:

- The discrete selection allows you to pick nodes in discrete lines between two nodes and automatically starts a new line to pick nodes from after each second node.
- The continuous selection allows you to pick nodes in a continuous line without separation.

These were not working properly previously and are now fixed.

Model Build

- **Case 56312**

Some spurious error messages about missing files when scrolling the model build template have been removed.

- **Case 56309**

When a model has been built from a PRIMER database, there should be a ‘link>database’ button on the master drop-down on the include tree. This button was obscured by ‘Re-order includes’ button added later. Issue now fixed.

- **Case 56206**

When nomenclatures were changed in model build coding to remove terms master/slave, the template save with orient points was broken and the help text also became very confused. This is now fixed.

Model Modified

- **Case 55520**

A model containing tabs can now be read using (at your own risk) ASSUME_6/8 option. It could not be read properly previously and is now fixed.

Additionally, there is a new option PERSIST_6/8 which can be used so subsequent internal read operations (such as model modified - compare to original) will work.

Morphing

- **Case 56203**

Previously, when using selection mode in the Morphing tool to make an initial selection of a drag handle associated with multiple morph points, all but one of these morph points would be highlighted in the background colour as opposed to the sketch colour. This has now been fixed such that all points are highlighted in the sketch colour.

In addition, when making a fresh selection of morph points after a previous selection of morph points that has since been reset, if the number of points selected matched the number of previously selected morph points, PRIMER would not issue a message to the dialogue box stating the number of morph points currently selected. This has been fixed such that PRIMER now issues this message in this event.

Nastran

- **Case 54647**

PRIMER crashed while it was trying to read a NASTRAN file with missing include file(s). This has been fixed now.

Orient

- **Case 55976**

Implementing read model 1, read model 2, delete model 1 followed by use of orient interpolation could result in a crash previously. This has been fixed.

- **Case 53871**

Orient of include with child include(s) will now, by default, orient child include(s) even if it is not selected. Issue fixed. This behaviour is particularly useful for command line contact orient which only allows you to specify one include. This may be configured by the preference ‘orient_child_include_with_parent’.

Parameter

- **Case 54722**

There were a range of errors in the handling of _MUTABLE parameters in conjunction with *INCLUDE files generally and *INCLUDE_TRANSFORM in particular.

For the general *INCLUDE case, the parent file did not necessarily ‘know’ that an include file referenced a mutable parameter, and therefore, did not precede the *INCLUDE statement with that parameter.

In the more specific case of *INCLUDE_TRANSFORM using a mutable parameter defined in the parent file, this could get ‘lost’ altogether when processing the include, and repeated use of the same include file (transformed into different positions) using versions of mutable parameters with different values for each include instance could end up using the wrong version of the parameter.

The processing of mutable parameters generally, and their usage with *INCLUDE files generally, has been greatly improved.

Part Tree

- **Case 53547**

When we have a tree with several parts (10 is enough to see it), if we select all of them and drag, the whole tree refreshes constantly, producing a flickering graphics issue. This has been fixed now.

Pedestrian

- **Case 55838**

The HIC tool could produce a JavaScript error ‘Window.EndLoop called without previous Window.StartLoop’. This issue has now been fixed.

- **Case 54932**

Previously, for GTR/UN R127 and GB 24550 protocols in the Pedestrian Markup Tool, in PRIMER selection of bumper beam parts was not supported. This has now been corrected.

- **Case 53602**

The ‘Cancel’ button in the Define windows of the pedestrian markup tool was not working as expected as pressing it would not revert the changes. Therefore, it has been removed. Additionally, the ‘Apply’ button has been replaced with a ‘Close’ button. The textboxes update as you are adding data, therefore, there is no need to press ‘Apply’ or close the window. Issue fixed.

Program Crash

- **Case 55432**

With ‘CleanUp Model’ panels opened, after panels were launched via PRIMER macros or JavaScript, PRIMER crashed when the ‘CleanUp Model’ panels are resized. Fixed this.

Python API

- **Case 54284**

PRIMER did not terminate if the gRPC connection could not be established in the Oasys.PRIMER.start command. Now fixed.

- **Case 53896**

The GetAll and GetFlagged methods for Oasys.PRIMER.Node, Oasys.PRIMER.Shell etc. would fail if there were more than ~300,000 objects in the list. This has now been fixed.

Read

- **Case 55911**

When a parent file contained a material, section, or part definition with a character label and referenced an *INCLUDE_TRANSFORM file which contained something referring to the material, section or part, PRIMER could report wrongly that a duplicate definition label clash had occurred. This was because the *INCLUDE_TRANSFORM file treated the reference to the item as a definition of the item in the label clash check. Now fixed.

- **Case 54112**

IGES files containing B-REP entities are now supported. Issue fixed.

Scripting

- **Case 56480**

If the module contained an error, PRIMER would not throw an exception when importing a module using dynamic module import. Now fixed.

- **Case 55957**

On higher resolution monitors (4k), the images in the ‘Sled Test’ script were scaled down. It is fixed now.

- **Case 55521**

In the Attached class of the JavaScript and Python APIs, links have been added to the Attached function of the Model class. Confusing API issue fixed.

- **Case 53825**

Resizing the graphics window caused UI problems with the JavaScript Running window. We see an unnecessary vertical slider, and if we scrolled down, we even see elements from the JavaScript tree. This has been fixed to make sure we are not in 'Running' mode before showing the script tree.

Segments

- **Case 53671**

Changes in PRIMER 21 to fix speed issues related to segments on *BOUNDARY, *INITIAL and *LOAD cards exposed two problems:

- The changes meant that it was no longer possible to convert these cards easily into their segment set variants (rare, but possible).
- Long-standing problems with graphics might mean that some of these cards were not drawn (only sketched), might not be screen-pickable even if visible, and the feedback given during screen-picking was not helpful.

These problems have now been fixed.

Sketch

- **Case 56052**

Clicking on 'Sketch all' more than once on the docked Contact panel or clicking 'Sketch all' then 'Apply' and vice versa makes the sketch disappear. This is fixed now.

Text

- **Case 55949**

Unusual node formatting in orient text boxes now fixed: changed lowercase m1n1 or m?n? to uppercase M1/N1 or M?/N? in the orient panels.

Thermal

- **Case 55435**

A zero MID field on part card edit/keyword panel is no longer highlighted in red if the analysis is purely thermal. The previous incorrect red highlight has been removed.

Transform

- **Case 55938**

PRIMER did not implement the correct behaviour for *DEFINE_TRANSFORMATION option TRANSL2ND with a3=0 (defined in R14 and above). Now fixed.

If required, the behaviour can be changed back to the old R12 and R13 behaviour using the preference primer*define_transformation_transl2nd_a3_zero

- **Case 55882**

Labels in *DEFINE_CURVE_FUNCTION expressions would not get updated correctly by PRIMER in some cases when the expression wrapped over multiple lines. Now fixed.

Unicode

- **Case 54744**

'ANSI' encoded include file comments should now be handled correctly by PRIMER. Issue fixed.

User Interface

- **Case 56240**

In Part Tree → Find, the up/down buttons (in Find and List) did not have modern icons. This is now fixed.

- **Case 56214**

Changed the Dummy Angles File retrieve tab, so that 'Move H-Point' shows in the tick-box design, rather than the toggle box design. Issue fixed.

- **Case 56200**

Fixed the width of Tools → Check Custom Preference File directory button so that the icon is no longer cut off.

- **Case 56116**

Fixed inconsistent panel colours in the Dark theme when running the HPM and HRMD tools.

- **Case 56075**

In the Model Build summary box, check box, and contact check box, there were some minor UI issues. Mainly wrong colour of background in some areas of the panels. Now fixed.

- **Case 55982**

Selected tab in the cross references panel would have a hover effect implying it could be deselected. This has now been fixed, only unselected tabs which can be clicked will have a hover effect. Panel headers have also been modified to be more consistent.

- **Case 55959**

After using select files to write a file, the filename is now correctly highlighted with red to indicate the file exists.

- **Case 55172**

Some buttons in Normals/Align, Remesh area, and Morph panels were not associated indicating that they are mutually exclusive. This has been fixed.

Volume III

- **Case 54188**

*EM_BOUNDARY_PRESCRIBED can now refer to a function via a negative ID in the field LCID in PRIMER.

- **Case 53868**

Previously, <MID> in *EM_MAT was a unique label and did not refer to the *MAT keyword, causing the label to be lost during renumbering.

It is fixed now. The <MID> field now references *MAT cards.

Write

- **Case 56242**

PRIMER will now print a message after successfully writing out an assembly file.

- **Case 56128**

Previous versions of PRIMER did not support the *TITLE card on a per-include basis. This had a couple of implications:

(1) *TITLE cards would never be written out to include files (only ever to the master model) even if input includes were to contain those cards.

(2) *TITLE definitions were previously parsed during model read on a last-one-wins basis. Consequently, the last *TITLE card read in (whether it be from the input master or from an include) would become the master model's *TITLE - the de-facto analysis title in effect.

These issues have now been fixed. *TITLE is now supported on a per-include basis. The master model and each include can carry their own respective *TITLE definitions.

- **Case 55135**

Fixed user interface inconsistencies and autoscaling in the Write Include panel.

- **Case 54205**

Write select files from the PRIMER tree will create directories in the expectation that files will be written. If no file is written, previously, the unwanted directory was not removed. This is now fixed: the unwanted directory will now be removed.

Additionally, if a file cannot be written due to read only file permission, the background will be orange-lit (as it will be for a directory without write permission).

Xref

- **Case 54996**

Previously, in the very unlikely case of a morph point being used in a morph flow definition multiple times, removing the point once would corrupt the cross references from the morph point to the morph flow. This has been fixed.

2.2 D3PLOT

Animation

- **Case 55712**

The File/Anim/Draw dropdown option and the options in the T/HIS panel during the linked session now work even during animation playback.

- **Case 55240**

Previously when animating the results of two implicit models in a window, using interpolation by time to ‘slow down’ their movement visually and magnification to make their displacements more visible, the 2nd model could fail to be interpolated correctly.

This was due to the combination of multiple models in a window, interpolation, magnified coordinates and – crucially – the presence of *DATABASE_CROSS_SECTION. The calculation of the magnified cross section geometry, which uses state 1 as its ‘undeformed geometry’ for displacement calculation, was corrupting the interpolation factor for the second model.

Fixed by changing the way the state 1 coordinates extracted for the database cross section magnified displacement calculation.

Annotations

- **Case 55826**

If an incompatible or corrupted annotations file was read into D3PLOT previously, an error message is shown, but D3PLOT could leave some data relating to these corrupt annotations in memory. Continuing with the session could lead to further confusing and spurious errors and warnings. This has been fixed so that corrupt annotations are now flushed from memory.

- **Case 55377**

If the window order was changed from default and an annotation was captured, when the annotation was reloaded the modified window order would not be remembered. This has been fixed.

- **Case 55307**

If a model with an annotation marked on part A was drawn in multiple windows and part A did not have the same blanking status in all windows, moving the mouse cursor between windows would cause the annotation marker in any window where part A was blanked to jump between the centre of the part and the origin previously. This has now been fixed so annotation markers will be drawn at the centre of the visible elements of the part in windows where at least some of the part is visible and at the true centre of the part in any windows where the part is fully blanked. This stops any apparent ‘jumping’.

Blanking

- **Case 53029**

Fixed a bug where the blanking lock status was not preserved in D3PLOT when unblanking entities in PRIMER through the link (and vice versa).

Blob Plots

- **Case 56141**

Some number format options for external data did not work very well with multiple models. Sometimes the data value format shown on the panel might be the format for the wrong model when different models are set to different formats. When the popup for the data value number format was opened multiple times in a session, sometimes it was completely blank. These problems have now been fixed.

Capture

- **Case 55784**

Previously when capturing an animation to the ‘Add item’ row in D3PLOT, an image would be captured instead. This has been fixed.

- **Case 55696**

Previously when D3PLOT was first opened, if the File Open panel was closed without opening a model, then opened again and a non-existent filename was entered into the filename textbox, then the file open panel was closed, D3PLOT would crash. This has been fixed.

Component

- **Case 54573**

If a thermal analysis (no displacements, velocities or accelerations) was read into D3PLOT, the initial component selected for the ‘Vel’ TAB in D3PLOT used to be the first Vector component available in the model (usually Temp Flux Vector).

The ‘Vel’ TAB is meant to be a special plotting mode that should only allow Velocity (default), Displacement and Acceleration vectors to be plotted via the ‘Vel’ button. All other Vector components should be selected via the ‘Vector’ TAB and plotted via the ‘Vec’ button. This has been fixed.

Contacts

- **Case 55864**

Previously, contact nodes were sometimes drawn on the omitted side of a cut section. This happened in a vector plot of contact forces. Now the contact nodes are omitted as expected.

- **Case 55703**

Vector plots of contact force at nodes were not working in a model when both structural elements and contact segments (attached to the same nodes) were both visible. Turning off the display of the structural elements restored the visibility.

Now fixed: Vector plots like this will now work so long as the nodes at which they occur are on unblanked elements / segments of any sort.

Contour

- **Case 55836**

The contour values on solid elements were calculated incorrectly if the default averaging options were changed and the ‘Part Ignored’ and ‘Blank Ignored’ options were turned off.

The mid-side and corner values for solids with multiple integration points were not calculated correctly if ‘high resolution’ contouring was turned on. This has been fixed.

- **Case 55809**

Type 23 shell elements have multiple on-plan integration points. If results were output for all on-plan integration points, D3PLOT did not correctly display the results. This has been fixed.

Cut Sections

- **Case 56483**

On the cut section custom spacing panel, the position showing 0.0 for the local cut origin is disabled. In some cases, another plane position was disabled instead of this. This could happen when there are two positions on the panel, where the first was positive and the second is 0.0, i.e. when the positions are not sorted after editing, and then the number of planes was increased. In this situation negative values are added to the end of the list. After clicking ‘Sort positions’ the first position with a negative value was disabled instead of 0.0. This has been fixed.

- **Case 56292**

Drawing true 2D capping thicknesses for a cut section crashed in a model with contact surfaces in the drawing modes Sh, Li and Hi. Now, they are drawn with fixed thickness even when another thickness option is selected. This is the same behaviour as for the drawing modes CT and SI and fixes the crash.

- **Case 56176**

Traces for nodes and other items sometimes crashed D3PLOT when cut sections were turned on in multiple directions. This has now been fixed.

- **Case 55776**

The screen space option for cut sections has now been removed because it was not used very much and did not work as intended.

- **Case 55767**

Union or intersection mode for cut sections was not saved in settings files. This support has now been added.

- **Case 55602**

When a cut section is defined by the Ansys LS-DYNA method and then the location is imported from a *DATABASE_CROSS_SECTION, sometimes, D3PLOT reported a false error: ‘Normal and edge vectors are collinear.’ In those cases, the cut plane location was not updated as expected.

Even when this error did not appear, the edge head vector could have been incorrect. As normal tail and normal head were correct, this gave the correct plane location visually, but the local X and Y axes in the plane could be rotated unexpectedly. This would have affected the output of forces and moments.

Now the cut plane location is updated as expected.

- **Case 55583**

On the cut section panel, planes can be defined by the Ansys LS-DYNA method with an imported *DATABASE_CROSS_SECTION. This button only ever updated the plane definition for the first direction D1, but not for D2 or D3. Now, it updates the plane for the direction whose tab is currently selected. Issue fixed.

- **Case 55472**

The force output on the cut section panel was incorrect when thick shell elements had significant stress in their local Z (thickness) direction. The calculation has now been improved to better match the *DATABASE_CROSS_SECTION forces output by Ansys LS-DYNA in the binout file.

- **Case 54355**

A new Element Capping thickness mode has been added in D3PLOT to fix the previous issue of having noticeable pauses during cut section operations. This mode reads in the true thickness value from ZTF file and is constant across all states of the analysis. The order of element capping in the UI has slightly changed and a new preference for true thickness constant scale factor has been added.

- **Case 54275**

The Union/Intersection radio button is now disabled when “Basic space” is selected. When Intersection is selected in “Deformed space” and then when switched to “Basic space”, we automatically switch to Union.

- **Case 54064**

Made changes so that the basic/deformed space switch applies to all the cut-section directions together.

- **Case 53563**

When a cut plane was close to the plane of the screen, the mouse needed to move quite far to achieve a relatively small visible change when the plane was dragged sometimes previously.

Now, the plane origin is moved such that its projection on the screen plane corresponds to the mouse movement.

When the plane is exactly the plane of the screen, the behaviour is still determined by UP/RIGHT for the positive direction and DOWN/LEFT for the negative direction. The angle tolerance when this behaviour happens has also been tightened from about 8 degrees to about 0.8 degrees for consistency with PRIMER.

Data Components

- **Case 55271**

Previously, if a vector plot of a contact data component was plotted, no vector arrows were displayed if the shell, thick shell or solid elements that the contact segments were on were also being displayed, but the contour bar would correctly show the component and range of contour values. This has been fixed.

Dialogue Commands

- **Case 56151**

Dialogue commands to interact with nodal rigid bodies were failing to process the string ‘nrbs’ correctly (noting that dialogue input is not case sensitive). This has now been fixed so that both ‘nrb’ and ‘nrbs’ can be used to access these entities.

Envelope

- **Case 55710**

The following Part Data components were plotted incorrectly for thick shells: KE_KINETIC_ENERGY, IE_INTERNAL_ENERGY, TE_TOTAL_ENERGY, GMASS, GVX_X_VELOCITY, GVY_Y_VELOCITY, GVZ_Z_VELOCITY, GVR_VELOCITY_RESULTANT, GMX_X_MOMENTUM, GMY_Y_MOMENTUM, GMZ_Z_MOMENTUM, GMR_MOMENTUM_RESULTANT, MD_MATERIAL_DENSITY, MM_MATL_MODULUS, MP_MATL_POISSONS_RATIO, MY_MATL_YIELD_STRESS, MF_MATL_FAILURE_STRAIN. They have been fixed.

- **Case 51733**

Suppose that a subset of states has been selected in the envelope options in the Data menu – for example, only the states with odd numbers. Then, if envelope options are opened in the Write menu and then we switch back to the Data menu, the states selected became confused. Now, the state selections for enveloping on the Data menu and for enveloping on the Write table are independent of each other and do not change when we temporarily open another menu.

FEMZIP

- **Case 55559**

When a file with extension ‘.d3plot.fz’ was opened in D3PLOT, e.g. “job_name.d3plot.fz”, the T/HIS link did not find files “job_name.binout0000” etc. This has now been fixed.

Similarly, for “job_name.d3plot.sdf”, which is another common naming convention for files from FEMZIP, the T/HIS link now finds “job_name.binout0000” etc.

Filename

- **Case 56219**

The Filename textboxes in ‘RECORD COMMAND FILES’ and ‘PLAYBACK COMMAND FILES’ panels did not accept filenames with very long paths. This has been fixed.

- **Case 55671**

When we open a ‘.d3ssd’ file in D3PLOT and then attempt to open another new model via ‘File → Open New Model,’ the ‘File filter’ in the OPEN PLOT FILE window was incorrectly displayed as ‘*.db’ instead of ‘*.d3ssd’. This has been fixed.

- **Case 55507**

Previously when choosing to open ‘Multiple Models’, D3PLOT listed *.ctf and *.ptf files as separate models. This has been now fixed to behave as follows:

- When a directory contains both *.ptf and *.ctf files, D3PLOT will list only *.ptf files
- D3PLOT lists *.ctf files only when the:
  - ‘File filter’ is chosen as *.ctf
  - Search directory has no result files other than *.ctf files or ctfiles
  - Search directory has extra *.ctf files or ctfiles whose matching pair of *.ptf file or ‘d3plot’ file does not exist

- **Case 55469**

When opening D3PLOT with a session file, it was not possible to select FEMZIP files without the ‘.fz’ extension, e.g. Zd3plot, as D3PLOT would not recognise these as valid results files. Now, result files with any filename convention can be opened. D3PLOT will check files are valid before attempting to open the session file.

Graphics

- **Case 56284**

Previously when animating, moving the mouse into the graphics window could slow the animation down whenever the cursor moved. This was because it was attempting to ‘predictive pick’ the item under the mouse which was not sensible or useful when the image was moving and consumed considerable CPU.

Fixed by ignoring mouse motion with no button pressed in a graphics window that is animating.

- **Case 56156**

With true sections turned on for beams, if a nodal component was plotted on discrete beams using SI or CT, the contour colours at both nodes would be the same and correspond to the data value at N1. This has been fixed so that the contour colours at the ends of the discrete beam correspond to the data values at the ends.

- **Case 55867**

If the Opacity switch was turned off for a CT/SI/VEC plot of a Contact data component, the Shells and Solids were still drawn 100% transparent if an SH plot was done afterwards.

To make the Shells and Solids re-appear it was necessary to turn Opacity back on. This has been fixed.

Help

- **Case 56069**

Corrected some Help texts in Display → Options.

Image

- **Case 55885**

D3PLOT would crash if a background movie or image was read in and displayed in a window which did not contain any visible models, if Quick Pick was active and the cursor was moved into the window containing the movie. This has been fixed.

JavaScript API

- **Case 55511**

Using the global GetData() JavaScript API function threw an exception when specifying the entity type using the Type class constant Type.NODE. This has been fixed.

- **Case 55026**

When running D3PLOT through command file, D3PLOT can now read the JavaScript argument without needing to have a model.

Labels

- **Case 54517**

For each node, the data value and nodal coordinates labels overlap, making it difficult to read. Now, they are mutually exclusive options which you can toggle between.

Measure

- **Case 54446**

To make things clearer in the Measure panel, we removed the words ‘Disp’ from the Mag Vals and Vect Vals tick boxes. Additionally, when the reference state switch is on, the reference state number can now be seen next to the Measure magnitude values.

Menus

- **Case 55221**

On Windows, any D3PLOT child windows that are dragged out onto the desktop appear as mini preview windows when you hover over the [D3] icon on the Windows taskbar. Each preview has an 'X' which if clicked on will close the window in question.

This went wrong in two ways:

(1) 'Always there' windows such as the Part Tree in D3PLOT disappeared and could not be re-instated – the dialogue box and graphics windows suffered the same fate.

(2) In some cases, the fact that the window was no longer there could cause a crash when D3PLOT tried to use it because it did not 'know' that the window had been deleted.

These are now fixed. 'Always there' windows will now be removed from the desktop by remapping them inside the D3PLOT master window, so they are moved rather than deleted. Windows which can be deleted legitimately, for example Open new model popup menu, is now deleted in a way which D3PLOT 'knows about' so there are no internal inconsistencies.

- **Case 55119**

Previously, if the Part Tree was undocked and the Data tab was clicked, the Part Tree would be closed. This has been fixed.

- **Case 54367**

The three tick boxes for the direction of cut section planes were getting mapped behind the Exclude Select Parts panel in the Cut Section menu. Now fixed.

Morphing

- **Case 52739**

Added eigenmode controls to the Deform → Magnify panel allowing you to modify these magnifications after the model has been read in. Issue fixed.

Part Tree

- **Case 54634**

If you had two models open in two windows (M1 → W1, M2 → W2), used the Part Tree to right-click and select assemblies in M1 to 'Only' in the window, then tried to do the same for M2 to show only the same assemblies, this turned off the entities in W1 so only W2 was displayed.

In D3PLOT 22.0, the right-click popup menu in the Part Tree has been modified so that instead of having an 'Only' button it now has two buttons:

'Only – (All Models)'
'Only – (This Model)'

'Only – (All Models)' is the same as the old 'Only' button and everything in all models apart from the item selected is blanked.

‘Only – (This Model)’ blanks everything in the model you have selected the item in apart from that item but leaves the blanking in any other models as it was.

Program Crash

- **Case 56496**

The dialogue command /BLANK STATUS crashed D3PLOT when a model with contacts was open. Now fixed.

- **Case 55462**

If a model was animated by interpolated time, and the frame times closely coincided with state times, D3PLOT could sometimes crash when the animation was paused. This has been fixed.

Python API

- **Case 56552**

In the D3PLOT API, none of the properties were read-only. Now, those which should be read-only have been made read-only.

Quick Pick

- **Case 56305**

Previously, for the first time the ‘Drag’ option was selected in the Cut Section menu, the drag operation was cancelled as soon as the mouse was moved into the graphics window, and you had to reselect the ‘Drag’ option a second time. This only happened the first time ‘Drag’ was used in a session. This has been fixed.

- **Case 55711**

D3PLOT would crash if a background movie was read in and displayed in a window which did not contain any visible models, if Quick Pick was active and the cursor was moved into the window containing the movie. Now fixed.

Read

- **Case 55628**

Using the PENOUT or ENGOUT fields on *CONTROL_OUTPUT (or *CONTACT) generates penetration and energy density data at nodes for _MORTAR contacts.

Using the KINENG field on *CONTROL_OUTPUT generated kinetic energy data at nodes.

D3PLOT will now read and display d3plot/PTF files containing these data.

- **Case 51760**

D3MAX files are now included in the list of valid input types to read into D3PLOT.

Recent Files

- **Case 55477**

A ‘Recent Files’ dropdown has been added to D3PLOT’s Background Images/Movies menu, allowing to easily select a file from recently browsed images or movies.

Scripting

- **Case 56024**

The GetData() function in JavaScript used to crash in D3PLOT when the current model has no window. It is now fixed.

Selection

- **Case 54354**

When picking entities in the graphics window for some Deform and Utilities tools, it was sometimes not possible to cancel the picking action without quitting the whole tool or switching to a different tool. In some cases, it was possible to cancel the picking action, but once cancelled, it was not possible to restart it again. These issues have now been resolved.

Session

- **Case 54837**

Reading an OP2 file (from Nastran) into D3PLOT, then updating and rereading the file can result in the ‘old’ (unchanged) file still being read.

This is more likely to happen when the file is on a network drive and is because the operating system is preventing the new file from being ‘seen’ by D3PLOT. While unproven, it seems likely that this is because D3PLOT leaves OP2 files open for further read operations, effectively locking access to the ‘old’ file on disk.

This has been fixed by adding auto-close logic to OP2 files. If no access is made to the file for a while, the file stream is silently closed, allowing the operating system to unlock it. If the file is accessed again, for example to read data at a different loadcase, it is silently re-opened then re-closed if is subsequently becomes idle again.

Settings File

- **Case 56258**

When the D3PLOT-T/HIS link was open and a T/HIS graph was made the child of a D3PLOT window, upon closing the D3PLOT model, D3PLOT would crash. This has been fixed.

Streamlines

- **Case 55896**

If a set of streamlines was created where the source was defined by picking a node then the start position of the streamline was not calculated correctly and often resulted in an incorrect error

message that none of the streamline start positions were inside the fluid volume. This has been fixed.

User Interface

- **Case 55851**

Choosing Properties in the Tools menu and clicking on the Contours option will now open the Data panel and make the ‘Contour Levels’ option tab active. Issue fixed.

- **Case 55770**

D3PLOT printed errors in the command prompt window when a new model was opened by setting custom states. This issue has been fixed.

- **Case 55239**

If you exited T/HIS in a linked D3PLOT-T/HIS session while the D3PLOT Layout menu was open, the menu did not refresh itself to remove any buttons it was displaying for T/HIS graphs. This has been fixed.

- **Case 51690**

Changed the old ‘Magnification Switch’ toggle on the ‘Deform → Magnify’ panel to the new ‘Display Magnification Factor’ tick box. Issue fixed.

- **Case 50297**

The button label was mapped on the right-hand side of the text input buttons in the ‘Set Times’ and ‘Set States’ panel. Swapped them to avoid confusion.

- **Case 49218**

The Components box will now say ‘Multiple components’ if multiple components are selected using the ‘+’ option. Also, disabled the component box to prevent single selection. The Component box gets re-enabled when the multiple selected components are removed until only one is left, through the multiple component selection page accessed by ‘+’.

Renamed the ‘Apply’ and ‘Cancel’ buttons in the Select Multiple components page to ‘Apply Select’ and ‘Cancel Select’ respectively. Issue fixed.

Variables

- **Case 56568**

D3PLOT could crash if user clicked 'New Window' button in the REPORTER panel when a D3PLOT or T/HIS item was selected. This has been fixed.

Workflows

- **Case 56409**

Fixed an edge case for the ‘Strength Check’ Workflow: if the workflow model is found in more than 1 window, the script now exits automatically.

- **Case 56211**

Fixed an edge case for the ‘Eroded Elements’ Workflow: if the workflow model is found in more than 1 window, a warning message is now issued.

Fixed an edge case for the ‘Eroded Elements’ & ‘Strength Check’ Workflows: if the workflow model is not found in any window, the script now exits automatically.

Write

- **Case 54495**

It was previously possible to write keyword data with enveloping enabled. This resulted in garbage output and has now been prevented.

XY plot

- **Case 48199**

In the XY data panel, if we select certain data components and entities, navigate away, then return to the same panel, the components/entities selections are now retained, unlike previously where the selections were reset.

2.3 T/HIS

Data Components

- **Case 55001**

The component ‘Velocity_Nodal_Loads’ has been renamed to ‘Prescribed Motion’ for Boundary Data. Issue fixed.

Datum

- **Case 54529**

Previously, moving or copying the last datum in a list could produce unexpected results. This issue has now been fixed.

- **Case 54521**

When creating a datum, if you were to not ‘Apply’ and then switch tabs on the panel, all information that you had pending within that panel would be cleared. Pending datum creation information is now retained between tab clicks until ‘Apply’ has been issued.

- **Case 53881**

The previous hard-wired limit of 256 for datums has now been removed from T/HIS. Any number of datums can now be created with machine specifications being the limiting factor.

FAST-TCF

- **Case 56296**

When we set x-axis and y-axis units for curves in T/HIS and write out a FAST-TCF script, the unit commands are now written correctly and on reading the script back into T/HIS, they are processed and set correctly.

- **Case 55930**

The FAST-TCF script was incorrectly written out for the operations that assign ‘X axis Unit’ and ‘Y axis Unit’ to the curves. This has been fixed now.

- **Case 55926**

When a FAST-TCF script referenced entities which do not exist, there were error curves created with a message ‘Curve not made successfully’. Now, the message says explicitly what item does not exist.

Filename

- **Case 56013**

T/HIS preference ‘this*macro_directory’ can now work with a path which contains quotes.

Integration

- **Case 54088**

Previously, it was possible for a graphics window to be incorrectly sized if:

(1) A D3PLOT session was started for a model

(2) T/HIS was launched from within that session to produce a graph

(3) REPORTER was launched and the graph was ‘captured’

(4) The T/HIS window was undocked and moved into a different monitor with a different DPI

(5) The ‘resize’ button on that undocked window was used to give it the same aspect ratio as the captured image.

This was due to a complicated series of events calculating various aspects of window size and resolution incorrectly and has now been fixed.

- **Case 53473**

Previously, if debugging is turned on in REPORTER, some debug / diagnostic messages reported from T/HIS could be classified incorrectly as errors (sent to the stderr I/O stream).

This has been corrected by sending these messages to stdout.

JavaScript API

- **Case 55782**

Previously, T/HIS would crash when closing a JavaScript that had launched a curve Select/Pick window, via Curve.Pick() or Curve.Select(), while the Select/Pick window was still open. This has now been fixed.

Additionally, calling Curve.Select() or Curve.Pick() with the modal option set to true would still launch the corresponding Select/Pick windows as nonmodal. This has also been fixed.

Finally, launching a Pick window via Curve.Pick() while a select window (launched with Curve.Select()) was still open would prevent curve picking when returning to the select window, and vice versa. This has now been fixed.

- **Case 55760**

The Graph properties auto_xlabel, auto_ylabel and auto_y2label were returning Graph.OFF when they were ON and Graph.ON when they were OFF. This has been fixed.

Additionally, the Graph property y2label property would either return a blank string if there were no curves on the graph or the label of the first curve on the Y2 axis, rather than the Y2 axis label. This has also been fixed.

- **Case 53509**

Dragging a box in the GUI builder window to select multiple widgets did not work when the cursor went outside the left-hand border of the window. This has been fixed.

- **Case 52334**

The function AddCurveID in the Graph class had an optional argument ‘no redraw’, which could be an integer 0 or 1. This has now been replaced with a Boolean argument ‘redraw’, so that the graph is redrawn if this is set to true or omitted. This is more consistent with other places in the JavaScript interface.

Old scripts with the argument defined as integer will continue to work, but that syntax is no longer recommended for new scripts.

LSDA (binout)

- **Case 55881**

T/HIS will not crash anymore when a graph contains UTF-8 or CJK text and the T/HIS window is shifted from one screen to another.

Menus

- **Case 55222**

On Windows, any T/HIS child windows that are dragged out onto the desktop appear as mini preview windows when you hover over the [Th] icon on the Windows taskbar. Each preview has an ‘X’ which if clicked on will close the window in question.

Previously, this went wrong in two ways:

(1) ‘Always there’ windows such as the Curve Manager in T/HIS disappeared and could not be re-instated – the dialogue box and graphics windows suffered the same fate.

(2) In some cases, the fact that the window was no longer there could cause a crash when T/HIS tried to use it because it did not ‘know’ that the window had been deleted.

This is now fixed. ‘Always there’ windows will now be removed from the desktop by remapping them inside the T/HIS master window, so they are moved rather than deleted. Windows which can be deleted legitimately, for example Operate panel, is now deleted in a way which T/HIS ‘knows about’ so there are no internal inconsistencies.

Operations

- **Case 55579**

When the colour for Injury Markers and Text was set to match the background, T/HIS previously rendered them in the background colour, making them invisible. This issue has now been fixed, ensuring they are drawn in the foreground colour in such cases.

Output

- **Case 56109**

T/HIS now adds extensions to output files when there no extension is provided. Issue fixed.

Read

- **Case 56306**

Previously for HDF5 files which contain very large amounts of metadata, some metadata would appear incorrectly within the attributes panel and potentially crash T/HIS. This has been fixed.

- **Case 55598**

T/HIS can now read stonewall energy data even if you do not select the RWFORC Card. Issue fixed.

- **Case 55437**

Previously when using ‘Pick Visible’ in the data reading object menu in the T/HIS link, selected items would not be sketched on the D3PLOT graphics window. This has now been fixed.

- **Case 55088**

Previously when trying to read a PTF file with a jobid into T/HIS, T/HIS would not pick up the corresponding readable files also containing the same jobid in the same folder. This is now fixed.

Recent Files

- **Case 55684**

When a file is dragged onto a T/HIS icon to open T/HIS, T/HIS will now remember the file for subsequent use in recent files dropdown menus.

Scripting

- **Case 55614**

Running a script by clicking on it in the script tree multiple times could cause an ‘Uncaught exception’ error if the script called Exit(). Now fixed.

Session

- **Case 53877**

T/HIS session file retrieval deletes existing graphs by default. However, a couple of other options are available: one to append to existing graphs and the other to produce an overlay.

The append and overlay modes had several issues and the following improvements have been made in that regard:

- The ‘Append’ mode was working like the default mode in the sense that existing graphs were being deleted. This has been fixed.
- Overlaying a session containing fewer graphs on top of one containing a greater number would previously result in the number of graphs being limited to the smaller of the two numbers. This has been fixed. T/HIS will now add new graphs as needed.
- Layouts could be altered for the entire session resulting in the original graphs being moved or, in rare cases, overwritten. This has been fixed. The layout of the original session is now retained to the extent possible, with the new session adding on to that.

States

- **Case 56216**

During a D3PLOT-T/HIS linked session while the Timeline is active, selecting any Tidy option turns the Timeline ‘Off’ on all the graphs, but the Timeline check box still showed it as ‘On’. This is now fixed. The check box will now update to be unchecked and the timeline is turned off when selecting any Tidy option from the T/HIS command menu.

T/HIS Link

- **Case 53872**

Previously, when using the D3PLOT-T/HIS link, T/HIS graphs and D3PLOT windows could disappear from pages if during the session T/HIS was swapped backwards and forwards between docked and un-docked modes while custom (Advanced) page layouts were also in use. This has been fixed.

Units

- **Case 55562**

While performing the HIC operation, T/HIS previously assumed time values were in milliseconds and automatically converted them to seconds if the total time exceeded 1.

Now, it determines conversion based on curve units and prompts you if the maximum time exceeds 10. Issue fixed.

User Interface

- **Case 55553**

Updated the Properties tabs to display the ‘Curves’ tab, when accessed from ‘Properties...’ button (in Automotive → THIV, Automotive → HIC, Settings → General). Issue fixed.

- **Case 54522**

T/HIS no longer maps the slider in the Datum panel unless the number of datums is greater than number of rows in the panel. Issue fixed.

- **Case 53477**

Fixed an issue in the Read → Screen menu where some of the Read options were not disabled when you clicked Start Curve.

Disabled all the read data buttons when start curve option is selected and enabled them back when end curve is selected.

- **Case 50521**

Shifted the ‘Confirm’ box for ‘deleting all curves’ closer to the cursor, for better accessibility. Issue is now fixed.

Volume III

- **Case 55610**

Support has been added for the new icfd_thermal.xxxx.dat file format from Ansys LS-DYNA R13.

- **Case 54411**

Added support for Scalar Potential in EM_NODOUT ASCII files and fixed reading EField components for 15 column-wide EM_NODOUT files.

Workflows

- **Case 55639**

Pressing the CORA button now picks up the script in the workflows directory instead of this_library. Issue fixed.

- **Case 55480**

When importing ISO-MME data, the ‘Unit’ header is used to automatically infer the units of each channel and when importing CSV data the Unit row is used. If unit data is not defined or cannot be interpreted, the unit system defaults to SI. Additionally, the new Import Configuration Window and accompanying Import Configuration CSV provide the ability to define the units and correct curve naming, polarity and scaling before test data is imported.

- **Case 54921**

Made several improvements to the Pulse Index tool to show stiffness with respect to unit mass, added filtering and read velocity options along with various usability and accuracy improvements.

Write

- **Case 55641**

T/HIS outputs ‘End of line’ text in ISO-MME version 2.0 and not Version 1.6. Issue is now fixed.

- **Case 55126**

T/HIS will now be able to printout file paths longer than 80 characters in length in the dialogue window. Issue fixed.

2.4 REPORTER

Capture

- **Case 55682**

Changes made in the ‘Edit D3PLOT Dialog’ or ‘Edit T/HIS Dialog’ before capturing will now correctly be loaded in D3PLOT and T/HIS.

- **Case 47783**

After setting the job file of a T/HIS item as empty, reopening the T/HIS Edit Dialog would previously restore the empty job to the default value. Now, it will remember the empty job file as expected.

Deleting

- **Case 55569**

REPORTER no longer crashes when deleting a page using the right-click menu of the page navigation buttons.

Edit

- **Case 56015**

The spinbox used to specify Variable precision has now been made larger to ensure visibility of its value.

- **Case 53765**

The positioning of dialog boxes should now exhibit a more predictable behaviour: they are either centred relative to their parent dialog box or relative to the mouse release point.

FAST-TCF

- **Case 55863**

REPORTER can now capture the minimum value on generating a T/HIS item, and on reloading the item back to T/HIS. Issue fixed.

Filtering

- **Case 53841**

The filtering of the ‘Choose a Template’ and ‘Choose a page’ dialog boxes is now fixed and works more intuitively.

Graphics

- **Case 56017**

The logic for drawing rectangles and ellipses when holding the Shift and/or the Ctrl keys has now been improved.

- **Case 55518**

REPORTER handles invalid files better when trying to import an item into the template.

JavaScript API

- **Case 55648**

Unicode characters are now correctly rendered in the JavaScript API.

PDF

- **Case 54152**

A ‘QThreadPipe: internal error’ message no longer gets printed to the command line when you open a PDF document on Linux. Issue fixed.

- **Case 54102**

The new features buttons on the splash screen dialog will now point to the correct pages in the new features PDF document.

Pages

- **Case 56119**

The page thumbnails in the page navigation bar now update automatically when you change the grid visibility. Issue fixed.

- **Case 56023**

The page navigation bar now updates correctly when you traverse your report/template by selecting items via the REPORTER item tree in D3PLOT and T/HIS.

- **Case 55570**

REPORTER now correctly displays the generation order number of items on the master page.

- **Case 55374**

The page thumbnails in the page navigation bar now update automatically when you capture from D3PLOT, T/HIS, and PRIMER. Issue fixed.

Program Crash

- **Case 55749**

The logic for reordering pages by dragging and dropping page navigation thumbnails has now been improved. Issue fixed.

- **Case 55723**

REPORTER now properly handles any modifications (creation and deletion) to your captures via the old method whenever you create or convert to a new D3PLOT item.

- **Case 55555**

REPORTER no longer crashes when you convert to the new capture method after editing the existing captures of your D3PLOT item.

- **Case 55063**

REPORTER will no longer crash if the reporter_library folder contains no templates/pages or if it contains invalid files.

Qt

- **Case 55483**

When opening REPORTER files with items missing a font name, a warning will be logged, and a default font name will be assigned. Issue fixed.

- **Case 55062**

REPORTER will no longer crash if the reporter_library folder contains no templates/pages or if it contains invalid files.

Read

- **Case 53055**

There is now better error handling for importing invalid files into REPORTER.

Template Files

- **Case 55687**

The GTR, Euro NCAP, and C-NCAP Head Impact templates were throwing errors when only the child list was provided. Issue fixed.

Text

- **Case 55636**

In the Font Substitution Dialog, if you choose to make the same replacements for other templates opened during the session, the option to preserve the original fonts and styles when saving the template will also apply to all templates. Issue fixed.

User Interface

- **Case 56063**

The Category and Value drop down lists in the ‘Edit Template Properties’ menu will now have sorted items. Issue fixed.

- **Case 55880**

When creating/opening a template, the REPORTER icon will no longer be duplicated in the top left corner of the main window. Issue fixed.

- **Case 55674**

When first opening REPORTER, the ‘Choose a Template’ dialog box will no longer load duplicated tabs if you open and close it several times in quick succession. Issue fixed.

- **Case 55486**

The Window::GetNumber() function from the JavaScript API will now display the correct GUI theme for the number field.

- **Case 55478**

Support for different DPI displays has been improved. Menus will now scale more appropriately with changes in resolution and scale.

- **Case 55235**

Previously, when closing REPORTER while having multiple unsaved templates open, if you chose to cancel the operation, REPORTER would remain open, but the dismissed templates would also remain behind as separate windows. This has now been fixed.

- **Case 54699**

Duplicating a page, generating a page, or importing an item onto a page via the JavaScript and Python APIs will now set the template corresponding to that page as active. Issue fixed.

- **Case 53630**

The options in the filters tree of the ‘Choose a Template’ and ‘Choose a page’ dialog boxes will always be visible now, regardless of machine resolution and scale. Issue fixed.

- **Case 52237**

Picking a screen colour now works when picking from another screen. Issue fixed.

- **Case 52190**

The text on script buttons will now have a more appropriate font size of 8 pts. Issue fixed.

Variables

- **Case 56071**

In T/HIS, if the variables for an item have been modified and then you select a different item in the item tree, an information popup is displayed with options to capture, ignore or cancel. Previously, no default behaviour was defined. This is now fixed: the capture button is highlighted and is selected if you click Enter on their keyboard.

- **Case 54335**

REPORTER can now identify report/template variables more accurately and makes sure to account for any formatting strings following the variable name. Issue fixed.

2.5 SHELL

User Interface

- **Case 56111**

The “recent” command line expression drop-down menu would sometimes showcase the path for the last file submitted. This is now fixed.

User Defined

- **Case 56326**

The "user-defined" option can be added while editing the LS-DYNA command line via the text editor in the SHELL submission panel. But this "user-defined" option was not getting picked up while preparing the LS-DYNA command files. Fixed this.

2.6 Oasys Suite – Cross Application

Menus

- **Case 52357**

The ‘placement’ preference has historically allowed you to start PRIMER, THIS and D3PLOT on ‘left’, ‘right’, ‘top’ or ‘bottom’ screens. However, this did not consider a multi-monitor desktop and would start the code in that subset half-space of the master monitor.

This has now been fixed on both Linux and Windows. If a desktop is made up of two or more monitors, then a placement option will start the code on the monitor which is closest (in pixel space) to the designated location, which may not be the main monitor.

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

Batteries

- **Case 55732**

Battery setup tool: Added the option to auto-generate an 2D array of unit cells and electrically connect (using *EM_ISOPOTENTIAL_CONNECT) the different unit cells together using a range of possible configurations.

- **Case 55085**

Battery setup tool: Added the option to swap the tabs for every other unit cell repetition.

- **Case 54991**

Battery setup tool: Created new post *END data to save battery definitions generated through the ‘Battery Setup’ tool as PRIMER entities. This allows the creation of multiple battery definitions within a model, as well as the ability to modify, delete, copy, orient and sketch an existing definition.

- **Case 54988**

Battery setup tool: Added the option to disable the automatic creation of *EM_MAT cards through the ‘Auto-create *EM_MAT cards’ tick box in the ‘Layers structure’ panel. This is turned on by default.

- **Case 54986**

Battery setup tool: Changed the default orientation so that the cell aligns vertically with the z-axis instead of the y-axis.

The following now applies:

- Battery cell height aligns with the z-axis
- Battery cell width aligns with the y-axis
- Battery cell thickness aligns with the x-axis

- **Case 54620**

Battery setup tool:

- Added the option to move between different steps using either the newly added ‘Previous’ and ‘Next’ buttons or the buttons at the top of the window. The tool will no longer automatically jump to the next step when clicking on ‘Create’ as before, but it will remain at the current panel to give the chance to check the settings and make any modifications (if needed) before proceeding to the next step.

- Added the option to undo creation of ‘Layers structure’, ‘Tabs structure’ and ‘Randles parameters’ using the ‘Undo’ button in each stage. Since some of the entities created during the ‘Tabs structure’ and ‘Randles parameters’ stages are dependent on entities created during previous stages, a warning pops up in case you attempt to delete entities at a stage that would delete entities at following stages. Additionally, going back to the ‘1. Geometry and Scale’ panel and attempting to change the modelling scale would also require deleting all created entities in steps 2, 3 and 4 as these are dependent on the selected Randles modelling scale. A preference ‘battery_undo_warn’ was added to give the option to disregard these warnings.
- Added the option to make modifications in the ‘5. Analysis panel’ after clicking on ‘Apply’. The ‘Apply’ button will get reactivated if any of the parameters in the panel get updated. However, unselecting a previously selected keyword will not cause its deletion, PRIMER will only add new keywords or update the parameters for selected keywords. Also, added a warning message that will popup if any of the selected Control keywords already exist in the model, to indicate that these will be overwritten. Another preference ‘battery_overwrite_analysis_warn’ was added to give the option to disregard this warning.
- Added the option to reset all the parameters to their defaults at any stage.

- **Case 54427**

Battery Setup Tool: Improved the file selection for importing csv data in the startup panel. The file can now be selected by either writing its path in the textbox or using the file selector and clicking on ‘Read CSV’ imports the data.

Belts

- **Case 55858**

To visualise node sets on seatbelt-related keywords, the sketching of the following entities has been added: *ELEMENT_SEATBELT_SLIPRING SBRNID, *ELEMENT_SEATBELT_RETRACTOR SBRNID and *SECTION_SHELL EDGSET.

When these keywords are sketched, a vector is drawn from the first to the last node in the set to help visualise the direction of the node sets.

- **Case 55510**

When activating pelvis buckle rotations, a warning message will prompt you to set the path point closest to the pelvis to the ‘Known position’ type to enhance rotation accuracy. You can permanently ignore this warning by setting the belt_ignore_pelvis_rotation_check preference.

Checking

- **Case 26417**

Check added for node on deformable to rigid part used by *CONSTRAINED_NODAL_RIGID_BODY.

Connections

- **Case 55218**

Modular bolts using *SET_SEGMENT_GENERAL now have an option to combine sets using a parent *SET_SEGMENT_ADD and automatically make a contact when the modules are made.

- **Case 54828**

The Connections creation panel and the Connections table both have some user-interface improvements including the renaming of some controls and the rearrangement of menu layouts.

- **Case 54676**

Beam welds previously supported either 6 or 8 elements/ring in the heat-affected zone. Options have now been added for 10, 12, 14, and 16 elements per ring.

- **Case 54644**

PRIMER now supports 2-hexa and 3-hexa solid spotwelds.

- **Case 54342**

A new option has been added so modular bolts can be made using unique deformable parts for each bolt.

- **Case 54327**

Improvements to UI/UX for bolts and the Connections → Bolt/Joint → Create → Library → Select bolt module in particular.

A search bar has been added at the top of the popup.

- **Case 51346**

A new line connection type called arc-weld has been added. This is a contact-based weld for use on free edges or feature lines. Each connection has its own contact, and thickness is incrementally increased (to the defined limit) until all nodes are tied.

- **Case 51339**

Added options to filter connections by PARTs (‘by layer panels’ or ‘by attached panels’) while using the Connections Compare tool.

Contacts

- **Case 55664**

By default, nodes in tied contacts that are attached to the segment are excluded from the analysis meaning they will count as untied nodes.

A new option ‘treat attached nodes as tied’ will mean these are counted as tied nodes.

- **Case 55385**

A new error check has been added for *CONTACT_AUTOMATIC_..._TIEBBREAK.
If the normals of the master segments point away from the tied node, an error is reported.

- **Case 54437**

Enhanced contact colours and sketching with user-defined colours for surf A and surf B have been added.

- **Case 54200**

Some enhancements have been made to the crossed-edge fixing tool. These include an extension of the shells selected for swap and an option to iteratively run the process to remove a wave front of crossed edges.

- **Case 51018**

Added a way to visualize automatic contact surface wrapping around the shell edge with a radius equal to one-half of the contact thickness. This can be done by selecting Part_Contact values in cut-section 2d capping and can also be visualized through the penetration check panel in wireframe mode.

Crash Test Setup

- **Case 51572**

Crash test setup: When using the rigidwall option for rigid frontal impact load cases, the sign of the rotation angle in the ROTATE row of the *DEFINE_TRANSFORMATION card that rotates the rigidwall by the impact angle, now always reflects the sign of the impact angle provided in the test settings.

Cut Section

- **Case 55757**

Positive and negative actions for cut sections can now be set as preferences primer*cut_section_pos_action and primer*cut_section_neg_action.

Database

- **Case 52563**

Added Xlsx option for exporting keyword data. Images can be written to excel file for keywords *DATABASE_HISTORY_BEAM, *DATABASE_HISTORY_NODE and *DATABASE_CROSS_SECTION.

Dummies

- **Case 55922**

The positioning cable nodes selected for each HBM assembly are now added into a *SET_NODE and the reference for this set is mentioned in the update *ASSEMBLY card for the *DUMMY definition of the HBM.

- **Case 55921**

A new functionality is created into the HBM positioning tools to facilitate ‘customised selection of nodes’ on HBM assemblies where the positioning cable elements can be attached.

- **Case 55920**

A new check button is added to the “Create Model” panel of the “Combined Dummy and Seatsquash” tool, to create a model ready for Ansys LS-DYNA positioning analysis “without” the encrypted HBM tree include.

- **Case 55919**

The *DEFINE_CURVE_SMOOTH definitions used in positioning cables elements for Dummies/HBMs have been replaced with *DEFINE_CURVE_FUNCTION to facilitate displacements of the positioning cables in a “sigmoid curve fashion”.

General

- **Case 55488**

The default for labelling nodes of sketched items has been changed to unconditional. The option for dynamic labelling remains but by default all labels will display even if they overwrite one another.

IGA

- **Case 51960**

Added functionality to read ASCII BASIS_TRANSFORM (BEXT) files.

- **Case 51751**

PRIMER now draws *IGA_SOLIDs both trimmed and untrimmed by *IGA_2D_BREPs.

Image

- **Case 49951**

Option added to read JFIF image format for backgrounds and watermarks.

Include

- **Case 55572**

Multiple Include files can now be selected by shift clicking with the mouse when scanning Include files and selecting Include files to write.

- **Case 54568**

When PRIMER is reading an input deck and fails to find an include file, it gives you the option of skipping this file and continuing the read process. This works, but historically that leads to the *INCLUDE statement being lost and not re-appearing in the keyword output file when the model is written out.

From PRIMER 22.0 onwards, the default is now to remember the *INCLUDE statement. Internally, the include file will be a latent entry in the include tree, which can be read if the missing file is moved to the specified location. On keyword output, the *INCLUDE statement will be written but the underlying file obviously is not.

This is a change of behaviour, the original behaviour of forgetting the file can be reverted to via the [Model] Read, Options panel or via a preference.

JavaScript API

- **Case 55905**

JavaScript API methods have been added to the IGAShell and IGASolid classes, IGAShell.RedrawAll() and IGASolid.RedrawAll(), to redraw all IGA_SHELLs or IGA_SOLIDs that have been affected by a change in any of their child IGA entities - e.g. when a control point(s), of a IGA_3D_NURBS_XYZ or IGA_2D_NURBS_XYZ, coordinates have been altered.

- **Case 55778**

Added “SetAssemblyPart”, “SetAssemblyPartSet” and “SetAssemblyNodeSet” to the JavaScript API Dummy class.

- **Case 53513**

Added JavaScript API for all IGA keywords available in PRIMER, except for keywords deprecated from Ansys LS-DYNA version R15.

- **Case 52735**

The memory for scripts is now automatically grown as required to run the script.

- **Case 38800**

For the JavaScript API Attached.SetEntity() method, added the option to select all entities or all constrained entities through the type argument using ‘ALL’ or ‘CONSTRAINEDALL’.

Keyword

- **Case 55866**

*DAMPING_FREQUENCY_RANGE is now created with _DEFORM by default which is recommended for most applications.

- **Case 54405**

RFAC and PRU fields, and optional card (if PRU = 2) have been added to the *MAT_MODIFIED_HONEYCOMB as per the Ansys LS-DYNA R15 manual.

Keyword Editor

- **Case 51303**

Added keyword editor for *DEFINE_CPM_GAS_PROPERTIES.

Labels

- **Case 55379**

Testing with a 330m element ‘gigacasting’ model showed that while everything worked, albeit slowly, screen-picking things generally and nodes in particular could be very slow.

Graphics also did not run as fast as it could because it was not optimised for very large models.

Both problems have been improved:

- Picking generally is a bit faster for very large models, but node picking should be many times faster.
- Graphics should be substantially faster on high performance graphics cards where previously it was being throttled by other factors.

Load Paths

- **Case 55539**

Added a new ‘Auto-create’ feature to the Load path tool to easily create multiple *DATABASE_CROSS_SECTIONs through a selected structure.

Mass

- **Case 55382**

Added mass may now be set on the DT2MS calculation tool by specifying a target mass i.e. structural + added mass

Orient

- **Case 51747**

PRIMER 21.0 implemented double precision for the storage of nodes and all internal transformations such as for *INCLUDE_TRANSFORM. However, the ORIENT panel, used for interaction transformations, continued to use single precision for the input of transformation data, limiting the precision of this to ~7 sig figs.

PRIMER 22.0 now uses double precision for all ORIENT panel input and the underlying processing of this is now also double precision throughout.

Output

- **Case 44703**

Previously, PRIMER was not able to write out the include files in a format different from the master file. So, we added a ‘File format’ option per include file to map the file format panel in the SELECT INCLUDE FILES TO WRITE window. This can be used to select different formats (ASCII/Binary/Compression) per include file while writing out.

Parameter

- **Case 55042**

The ‘pow’ syntax (for ‘to the power of’) can now be used in the parameter expression editor.

Part Table

- **Case 49273**

It is now possible to automatically resize columns in Part Table and Part Compare Table to fit their content. This can be done by double-clicking on the right-hand edge of the column header. There are also two new buttons, one to automatically resize all columns in the table to best fit their content and one to reset the size of all columns back to the same size. This is similar to existing behaviour in the Keyword Editor.

Part Replace

- **Case 54221**

PRIMER 22.0 now has a new preference ‘spotweld_remake_auto_remove_layer’. When it is TRUE, PRIMER will automatically remove layers that failed to connect when remaking spotwelds.

Pedestrian

- **Case 53595**

The pedestrian markup tool can now be viewed without loading in a model, including being able to browse the available protocols without selecting the outer parts.

Renumber

- **Case 55695**

Connections may be grouped by setting strings for title and/or user data. The connection object menu filter allow selection by this string to retrieve a group of connections.

Scripting

- **Case 54387**

The ability to open the help manual from the SBA, Luggage Retention, and Sled Test tools input panels has been added.

In the SBA tool, a check has been added for constrained extra nodes, and PRIMER now throws a warning if any node in the set either belong to NRB, Rigid bodies or refers to a part that is rigid.

An additional option to constrain the inertia loading device using rigid bodies has been added.

In the luggage retention tool, the sliding planes have been constrained to the bottom rigid plate such that they all move together.

A check for constrained extra nodes has been added such that PRIMER now throws a warning if any node in the set either belong to NRB, Rigid bodies or refers to a part that is rigid.

Tables

- **Case 53582**

The option drop-down on the table edit panel now allows existing _NONE table to be converted to _2D. Additionally, model check warning and autofix are now available to fix all _NONE tables in the model by converting to the preferred _2D format.

Views

- **Case 55441**

It is now possible to set the target and eye position from the JavaScript and Python APIs.

Volume III

- **Case 53914**

Added the drawing and picking functionalities for *EM_ISOPOTENTIAL and modified the sketching to connect composite nodes by lines.

Added the drawing, sketching and picking functionalities for *EM_ISOPOTENTIAL_CONNECT.

Added a new entry in the ENTITIES panel that controls the drawing and labelling of *EM_ISOPOTENTIAL and *EM_ISOPOTENTIAL_CONNECT.

Added *EM_ISOPOTENTIAL to the list of ‘find attached through’ types within the Attached tool.

Xref

- **Case 54403**

*EM_MAT_001, etc. reference a structural material. This will reference one or more Parts. The xref viewer when applied to the *EM_MAT will now show these parts. It may be considered a virtual reference.

3.2 D3PLOT

Contour

- **Case 54666**

Added new Data Plot Refresh controls to the Data panel to automatically refresh data bearing plots when a top-level setting is changed. Also added a button in the panel to manually refresh them if desired.

Cut section

- **Case 55758**

Positive and negative actions for cut sections can now be set as preferences d3plot*cut_section_pos_action and d3plot*cut_section_neg_action.

- **Case 51049**

The rows on the cut section forces table can now be sorted by their value in a given column. This is done by clicking on the respective column header, where two clicks give backwards sorting. This is the same behaviour as in the Write table.

Envelope

- **Case 22898**

In D3PLOT 22.0, you are now able to save and retrieve envelope data.

As well as interactive controls, we have provided an option to save envelope files via the batch command line option ‘-env_out’ along with a settings file. This may be particularly useful for automatic runs where more complicated and lengthier calculations are required. Once generated, the envelope file can be retrieved in a new session within seconds.

More information about this feature can be found within the manual as well as the new features documentation.

Graphics

- **Case 53165**

D3PLOT 22.0 now fully supports the Cohesive solid element formulations where the node ordering follows the Thick Shell order instead of the normal solid order.

Previous versions of D3PLOT would display these elements but would draw the wireframe overlay (and free edges) incorrectly. Any results plotted on the elements were correct.

- **Case 52798**

Lighting states for windows and annotations are now reflected in D3PLOT Viewer when viewing GLB files exported from D3PLOT.

- **Case 47698**

Improved part-screen logic to be responsive according to changing window size and number of fixed labels present in the header and contour bar areas. Added a preference to let you choose from one of the Full Screen, Part Screen and Report format.

Manual

- **Case 56204**

In most JavaScript API and Python API classes, GetFromIndex starts at index 0. This has now been clarified in the manual without changing the functionality in D3PLOT.

Movies

- **Case 51557**

For MP4 movie files, it is now possible to specify a target file size in megabytes. This is only a target and not a certainly achieved exact size. In our internal testing the actual file sizes are a few percent smaller than the target.

Performance

- **Case 55194**

D3PLOT has been tested with a “Gigacasting” model containing 330 million elements and, after changing some internal address arithmetic from 32 bit to 64 bit, it now handles very large models.

Preferences

- **Case 52710**

Preferences to control the initial visibility for the following have been added:

- sph_visibility controls SPH elements
- des_visibility controls DES elements
- cpg_visibility controls CPG particle visibility

All are on by default.

Recent Files

- **Case 52986**

A “Recent files” dropdown list has been added to the Background Images/Movies menu.

3.3 T/HIS

Data Components

- **Case 55752**

Recent versions of Ansys LS-DYNA now write the Normal force for Rigidwall Segments to the RCFORC file. T/HIS can now read these from both the LSDA (binout) and ASCII files.

- **Case 54574**

T/HIS 22.0 supports the new data components written to the BINOUT and ABSTAT_CPG files for models containing CPG Airbag definitions.

Filtering

- **Case 53056**

T/HIS's filters are up to date according to SAE Journal 211 199503. T/HIS performs Forward-Backward Filtering to avoid any phase shift in its results.

JavaScript API

- **Case 55772**

A y_axis property has been added to the Curve class to get/set which Y axis the curve is using, either Curve.Y1_AXIS or Curve.Y2_AXIS.

- **Case 55759**

A show_y2axis property has been added to the Graph class to turn the Y2 axis on and off.

- **Case 55564**

The function assigned to the Window onClose event can now return false to prevent the window closing if required.

- **Case 54612**

New functionality has been added to the JavaScript API that allows you to both set and query model and display units. The relevant methods can be accessed from the Model and Units classes respectively.

Operations

- **Case 48542**

T/HIS now supports Occupant Load Criterion (OLC) calculation via the Automotive menu.

- **Case 48427**

T/HIS now supports Tibia Index (TI) calculation via the Automotive menu.

- **Case 53115**

T/HIS now supports Damage (DMG) calculation (a measure of head injury) via the Automotive menu.

Units

- **Case 55754**

To define the unit system for curves imported from '.cur', '.csv', or 'ISO channels', 'Curve Unit System' dropdowns have been added to the T/HIS Curve, CSV, and ISO Read menus.

Workflows

- **Case 55584**

Added support in Automotive Assessments and REPORTER Templates for IIHS Front SOB 2024 and IIHS Side MDB 2024.

- **Case 50020**

Added a new Curve to ISO-MME workflow tool to export T/HIS curves in ISO-MME format on the fly. The same option can be accessed via Write → ISO-MME → Curve.

Write

- **Case 55165**

Created some new controls to open the Curve to ISO-MME tool from the Write panel. There are two radio buttons: Curves and Models. Curves is the default which allows you to generate the ISO-MME results through the Workflows tool. Models sets it to the original method where you need to select the model(s) and a configuration file.

3.4 REPORTER

JavaScript API

- **Case 55883**

The REPORTER JavaScript and Python APIs now feature a new property ‘generating’ for the Template, Page and Item objects.

- **Case 54431**

The Item.RemoveCondition method has been added to REPORTER’s JavaScript and Python APIs to allow you to remove any conditions that have been set to items. Also, providing a name is now mandatory when creating conditions.

- **Case 54255**

REPORTER now supports ES6 modules, which give JavaScript built-in support for modular programming using the import and export keywords. REPORTER also now accepts the ‘-js’ and ‘-js_arg’ command line arguments for running JavaScript scripts with arguments.

Pages

- **Case 54626**

The page buttons in the page navigation bar now have a new right-click menu option that allows you to edit the page properties.

- **Case 53897**

The thumbnails for the page buttons in the page navigation bar now update more efficiently when switching between design and presentation views.

- **Case 53104**

We now support ‘.ortx’ and ‘.orrx’ file formats when importing a page into your current template/report.

- **Case 52803**

REPORTER now displays the page number and title underneath the page button in the page navigation bar and as a tool tip whenever you hover over the button.

- **Case 52652**

The Del key functionality has now been enhanced in REPORTER. If any items are selected on the template, pressing the Del key will delete those items (existing behaviour). However, if you navigate between pages using the page buttons in the page navigation bar and have not interacted with the template, pressing the Del key will delete the current page. A faint border will appear around the page button to indicate that the Del key will delete this page.

Program Crash

- **Case 55853**

REPORTER will now attempt to write the logfiles in case of a crash. If no log file command argument has been provided, these will be written to a reporter.error file.

- **Case 55677**

REPORTER now makes it easier to report crashes, by pre-populating an email with stack trace information for you.

Python API

- **Case 53910**

Improved the way optional arguments are handled in the Python and JavaScript APIs.

Undo

- **Case 50876**

REPORTER now includes undo and redo functionality for most actions, providing the ability to correct mistakes and return to previous states easily. An undo history view is also available, allowing you to easily navigate through previous states within your session. The undo stack will be cleared whenever you generate or run scripts.

Workflows

- **Case 52051**

Automotive Assessments Euro NCAP MPDB (Occupant Assessment) updated to 2024 to include DAMAGE modifier.

- **Case 51485**

Support for UN ECE R94, R95, R135, and R137 has been added to the Automotive Assessments Workflow and associated REPORTER templates.

3.5 Oasys Suite – Cross Application

Program Crash

- **Case 55688**

The Oasys Suite has always produced dump files on Windows platforms when it crashes, but these have been a bit hidden away into the AppData/local/temp directory which is hard to find.

Dump files sometimes give the ability to work out why the software crashed so receiving them is valuable. Therefore, a new capability to create an email, preconfigure it with information and attach the dump file has been created in Oasys 22.0.

It must be stressed that this is not sent automatically. You must choose to create the email, and once it appears in your mail client software, choose to send it. This behaviour is configurable so if you wish to turn this feature off, you can do so.

Workflows

- **Case 54655**

Added DRIVER_HEAD_EXCURSION assessment type to Automotive Assessments Workflows.

- **Case 54631**

Support for Validation Criterion 2 required for EuroNCAP Far Side Virtual Testing Protocol has been added in Automotive Assessments Workflows.