

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

from Oasys Ltd



SHELL

PRIMER

D3PLOT

T/HIS

REPORTER

Version 19.0

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# 1 Introduction

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The Oasys Ltd LS-DYNA Environment 19.0 suite, dated March 2022, 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 18.1). Each ‘Case ID’ referred to in these lists is unique and should be cited if more information or clarification are required.

## 1.1 Compatibility with LS-DYNA releases

The 19.0 release has been used and tested with LS-DYNA version R13 and the current development version. It supports all the keywords in volumes I, II and III of the released R12.0 User’s Manual. Most of the new keywords in the released R13 User’s Manual are also supported.

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

## 1.2 Hardware platforms supported

The complete Oasys Ltd LS-DYNA Environment 19.0 is available on the following platforms:

|                |  |        |
|----------------|--|--------|
| <b>Windows</b> | Windows 10/11                                | 64 bit |
| <b>Linux</b>   | RedHat Enterprise 7.x, RedHat Enterprise 8.x | 64 bit |

For simplicity of support and maintenance only the RedHat Enterprise 7.x build has been released on the website for Linux as this has been found to run on all the machines we have tested (RHEL 7, RHEL 8, SuSE 12.4).

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

## 1.3 Graphics hardware supported

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

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

## 1.4 Licensing

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

To ensure you're ready to enjoy all the great features Oasys Suite 19.0 will bring, we recommend you update all your Oasys Suite license servers and files as soon as possible.

### Action to take

If you're using a floating network license you will need to install the LM-X license server software (version 5.2). The software and supporting documentation are available to download from our website and are also included in our installation packages.

### Backwards compatibility

The Oasys Suite 18.0 LM-X license file and license daemons are backwards compatible for all currently supported versions of Oasys Suite. This means that any existing 18.x, 17.x and 16.x software will continue to work with new LM-X license files and servers.

## 2 Bugs Fixed

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

### 2.1 PRIMER

#### Belts

- **Case 47037**

The seatbelt fitter has an optional 'initial depenetration' phase which attempts to sort out any small penetration errors in the belt path before the form-finding (fitting) process commences. This also tries to depenetrate any sections where belt paths inter-penetrate, typically at the entry and exit points of sliprings, which requires it to choose which path segment should be 'in front' and which 'behind'.

By default this in front / behind determination of overlapping belt segments is calculated automatically, using a majority voting algorithm. Occasionally it comes up with the wrong answer with the result that a belt path which is correct, even though it has no inter-penetrations, can end up being messed up by a spurious attempt at initial depenetration which tries to move the wrong belt path segment to the front.

This has been fixed as follows:

In V18.1 a 'behind' segment is only moved if it actually inter-penetrates, or is very close to doing so. Previously it would be moved even if it was quite a long way from inter-penetration.

In V19 the same fix is applied, but in addition a new 'Settings...' set of options is provided for initial depenetration which permits the in front / behind status to be set manually, or turned off altogether.

#### Checking

- **Case 48057**

Previously, once the Check Options panel's category has been changed to 'Other', the buttons 'Omitted keyword output data fields: [drop down box]' for this category remains on the panel even after the category has been changed to something else. This bug is now fixed.

- **Case 47067**

Whilst PRIMER tests for collinear beam N3 there was no test for the case when a vector VXYVZ is defined. It seems that LS-DYNA reports an error if the angle is less than 0.001 radian so this is now used for PRIMER's error check. There is also a warning if the angle passes this test but is less than 1 degree.

- **Case 47040**

If \*AIRBAG\_REFERENCE\_GEOMETRY for a node is defined but that node label has no actual \*NODE card PRIMER correctly detects that the node is effectively 'referenced but not defined'.

Many versions ago this error detection used to have an auto-fix which would create the node using the reference geometry coordinates, but this auto-fix has ceased to work since (at least) PRIMER version 13.

The fix for this is version-specific:

In V18.1 an autofix has been added to this error when detected as part of the checking of \*AIRBAG\_REFERENCE\_GEOMETRY, allowing all such nodes to be created automatically.

In V19 a more extensive fix has been performed:

- The autofix in \*AIRBAG\_REFERENCE\_GEOMETRY checking mentioned above is added.
- A similar autofix is added to \*AIRBAG\_SHELL\_REFERENCE\_GEOMETRY to create nodes referenced on shell cards, using the coordinates of the nodes on the actual shells.
- The original check and autofix when checking \*NODE cards has been reinstated, giving an alternative way of solving this problem.

- **Case 44813**

Database scalar keywords were not checked when performing a model check. This has been fixed.

- **Case 43878**

Previously, some places in PRIMER still referred to DYNA3D. These have now been updated to refer to LS-DYNA instead.

The dialog box read commands: DK\_DYNA3D\_KEYWORD, DF\_DYNA3D\_FORMATTED; and write commands: DK\_DYNA3D\_KEYWORD, DB\_DYNA3D\_KEYWORD; have been deprecated and replaced with: (read) DK\_LSDYNA\_KEYWORD, (read) DF\_LSDYNA\_FORMATTED, (write) DK\_LSDYNA\_KEYWORD, (write) DB\_LSDYNA\_KEYWORD; respectively. Any scripts, macros, etc. using the deprecated commands will still work, however they should be updated to use the new commands instead.

## Clipboard

- **Case 47382**

Now PRIMER copies IGA part properly when save as model with Find referenced items option is used in clipboard to new model.

- **Case 46703**

The Clipboard Merge into model and Save as model, model selector was not working after reopening the Clipboard. This has been fixed and a model can be selected by typing the model into the textbox or by using the model selector.

## Comments

- **Case 47327**

All ANSA comments were ending up in all include files, rather than just the ones originally in that include file. Fixed this issue.

- **Case 45155**

The problem of \*COMMENT cards being written out multiple times was fixed during the work done for 'anchored' comment handling as part of case 45241.

## Contacts

- **Case 47826**

Ill-conditioned meshes, particularly those with trias, were giving spurious penetrations for single surface contact when soft = 0,1. This has been fixed.

- **Case 47042**

Use of SNRDE > 0 was incorrectly reported as error when SOFT=2. The check has been removed from v18.

For v19 the check on SRNDE for SOFT=0,1 has been updated from remark 3 of the LS-DYNA manual on \*CONTACT.

- **Case 46779**

The logic that determines whether nodes of tiebreak contacts (with or without offset) tie has been revised to follow the tolerance calculation in the LS-DYNA manual.

For MPP, this is contact thickness + 0.01\*sqrt(2 x master segment area)

## Contour

- **Case 47577**

The position of text of contour bands was not correct when the dimensions of the graphics window were small, especially when the vertical dimension of the window was larger than the horizontal dimension. This has been fixed.

- **Case 47559**

Fixed a typo in timestep contour setting.

Fixed a false error for '<auto>' as values in Min/Max value boxes.

Made 'Material Type' as consistent name in contour bar and setting strings.

Fixed the Error button not being mapped in Mass Scale Setting Menu.

Increased the width and relocated the 'Shell Intg Pt' menu for 'element prop' -> 'plastic strain'.

## Crash test setup

- **Case 47057**

Test images in the crash test setup script could appear small on 4k monitors. They now fill the whole frame like they do on a standard monitor.

## Curve menu

- **Case 45949**

The K button in the loadcurve edit panel is designed to automatically load the keyword manual on the page that's appropriate for a particular curve or function subtype. This logic was incorrect for two of the curve subtypes which would cause the manual to open on the wrong page (still in the \*DEFINE\_CURVE section though). This has now been fixed.

## Cut section

- **Case 46807**

The thick shell capping case showed incorrect capping for contact thickness shells and cut-section ON hindered switching to optt/sft thick plot. Fixed it.

- **Case 46684**

The graphics did not always update correctly when there were multiple cut sections. This has been fixed.

- **Case 46682**

PRIMER was not always selecting entities correctly when there were multiple cut sections. This has been fixed.

- **Case 46430**

Shell 'True Flat' could not be turned on whilst a cut section was turned on. This has been fixed.

Made True Beam Sections settings in display options and cut-section panel dependent on each other.



- **Case 45316**

Suppose that a cut plane intersects a shell such that one of its nodes is exactly on the plane and the adjacent nodes are on different sides of the plane. In that situation the intersection line segment of the shell with the plane was not drawn in PRIMER. Now it is drawn in the same way as for other (more general) positions of nodes relative to the plane.

## Damping

- **Case 46488**

Added a radio button box in \*DAMPING\_PART\_MASS and \*DAMPING\_PART\_STIFFNESS create panel, through which the user is now able to create single or multiple definitions.

## Deleting

- **Case 46803**

Added macro tags for 'Delete Recursive' & 'Remove From Sets' check-box in the delete pop-up in keyword editor.

## Edit

- **Case 47261**

PRIMER was not showing optional cards 5, 5.1 and 5.2 in SECTION\_SHELL when required. This has been fixed.

- **Case 47197**

Previously, for some open-ended style keywords whose scalar editors would add a single new entry field at a time (\*DEFINE\_DRIFT\_REMOVE, for example), PRIMER would hang if the last field of a row was set to 0 while there were still some populated fields in the next row. This has now been fixed.

- **Case 46693**

Scroll bar in ICFD\_SET\_NODE keyword was not extending after making 56 entries in View/Edit mode. Now scrollbar kicks in after making 56 entries.

## Elements

- **Case 43694**

Zero length discrete beams have a negative N2 label, with  $N2 = -N1$ . This was not correctly handled before. When renumbering the node, N2 was lost. And when merging 2 models, which implies node renumbering, error messages were displayed.

## Encryption

- **Case 47450**

Encrypted data was being lost when merging models that both had encrypted PGP data. This has been fixed.

## Error trapping

- **Case 46589**

PRIMER issued a confusing error message if it read a model with a blank line that shouldn't be there. It printed two line numbers, the first of which was misleading. This has been fixed.

## Frequency

- **Case 46789**

PRIMER gave a wrong error about missing data on \*FREQUENCY\_DOMAIN\_RANDOM\_VIBRATION (for fields in card 7) when the \_FATIGUE option was not selected. Now fixed.

## General

- **Case 47867**

The LS-DYNA submission via the PRIMER 'Submit' panel was not happening for keyword files with extensions other than '.key'. Fixed this.

## Graphics

- **Case 47635**

When rendering points to display beam end releases sometimes PRIMER would not draw those points to correct size especially on a low resolution display, it would at times take a size larger than specified. This has been fixed.

- **Case 47607**

oa\_pref options for graticule and overlay colours were not getting written out. This has been fixed.

- **Case 47606**

A \*DATABASE\_CROSS\_SECTION keyword created normal to a feature line could have the normals facing in one direction, then on clicking the '+' button to move it the database would move in the -ve direction and normals would switch direction. This has been fixed.

- **Case 47580**

In the rigidwall edit panel, when modifying values, the graphics of the rigidwall were not updating immediately. Pressing 'Update' or forcing a redraw was necessary. This has been fixed.

- **Case 47579**

The screen text generated by the Mesh Volume Analysis tool was always coloured black, which meant it was not visible when the background was black. PRIMER now changes the colour from black to white if a black background is used.

## IGA

- **Case 47713**

PRIMER wrote out a single keyword header for \*SECTION\_IGA\_SHELL/IGA\_SOLID for multiple entries, but this resulted in some warning messages when run in LS-DYNA. A keyword header is now written for each entry.

- **Case 46035**

The trimming curve on a surface was not being processed correctly when tessellating, caused by a very thin tria with a short edge on the trim curve. A tolerance has been increased to avoid this issue and a 'glum\_vertex\_tol' preference has been added to give some control to the user over this issue.

## Include

- **Case 47104**

When an include file is deleted, model modified will now red-light the parent include as modified, when you use the 'find modified' tool.

- **Case 47088**

Now that compression to .gz and .zip format is an option in PRIMER this raises the question of how compressed filenames should be referred to in \*INCLUDE statements and also how they should appear in the user interface.

In V18 and earlier they were always referred to by the 'raw' names, for example if we read child.key.gz we still referred to it as child.key in the GUI and in \*INCLUDE cards. This caused some confusion since it wasn't always clear from the GUI that a file was compressed; it also wasn't clear which had been read when multiple versions of a file were present on disk, for example if both child.key and child.key.gz were present. To address these issues the following changes have been made:

The GUI now provides warnings and feedback in four separate places when some variant of a filename has been read. Locations (1) to (3) are new in V19, location (4) was in V18.

(1) In the INCLUDE tree the actual file read (for example child.key.gz) is now listed first with the raw name (eg child.key) appended. There are symbols to denote compression and binary, and also a warning symbol if the file read is not the raw name in the include statement or there were multiple doppelganger candidate filenames. Hovering over such a row gives details of the differences.

(2) In the PART tree there is a cut-down version of the above. The actual file read rather than the raw name is reported with a [\*] after it to act as a warning, and hovering over that row gives details.

(3) In Model Check there are three new categories of warning for include files:

- If the file as read is compressed / binary and therefore would not be directly readable into LS-DYNA.

- If the raw filename could not be found but a single alternative filename, found by fuzzy-matching the name, has been read instead.

- If there were multiple variations of the filename.

In all cases asking for 'details' (or 'explain') will list the various filenames in detail explaining what was actually read.

(4) In the pre-output check panel a model which will not read into LS-DYNA because of compression/binary is highlighted in red, hover over gives details.

## JavaScript API

- **Case 47926**

The onChange property was not available for comboboxes in the GUI Builder properties window. This has been fixed.

- **Case 47743**

JavaScript API SSH function 'Execute' was not giving out the 'status' property from the returned JS-Object. Fixed this.

- **Case 47375**

A new property addKeywords has been added to the Material class to obtain the number of \*MAT\_ADD cards that are defined for a material. Additionally the Keyword and KeywordCard methods in the Material class can now take an optional integer argument to return the \*MAT\_ADD data.

- **Case 46780**

PRIMER could crash, due to an error in the SetTableEntry() method in the Curve class. This has been fixed.

- **Case 46472**

Updating a parameter could sometimes fail if the model contained invalid parameter expressions. If this happened an exception was not thrown correctly. This has been fixed.

In addition, new methods SaveAll() and UpdateAll() have been added to the Parameter class to enable multiple parameters to be changed before PRIMER updates the model.

- **Case 46011**

Fixed a JavaScript API bug for \*CONTACT where the get and set functions for fields SBOXID and MBOXID were not handling negative values and parameters correctly.

- **Case 46010**

Fixed a bug in keyword \*CONTACT when the SOFT field value was erroneously changed when the VSF field value was edited by JavaScript. Now editing the VSF field with JavaScript does not affect the SOFT field value.

- **Case 45259**

Support for ES6 modules has been added.

## Keyword

- **Case 47510**

Previously, PRIMER would issue a warning regarding the omission of an invalid \*FREQUENCY\_DOMAIN\_RESPONSE\_SPECTRUM field, RELATV, when writing the keyword out in versions prior to R11 (except for 971R6) even when the field had not been set (was zero). This has now been corrected such that the warning is only issued if the field is non-zero.

- **Case 47509**

If there was no data on card 3 of \*CONTROL\_THERMAL\_SOLVER PRIMER issued a warning about it being invalid. It should have only issued the warning if there was some data in card 3. This has been fixed.

- **Case 47442**

Changed card 1 field 8 from OUTPUT to INICRT for the <none> suffix of \*MAT\_COHESIVE\_MIXED\_MODE\_ELASTOPLASTIC\_RATE (MAT\_240). However, the field will be treated out as OUTPUT when writing out models for versions <R8.

- **Case 47391**

\*BOUNDARY\_PRESCRIBED\_KEYWORD keyword panel previously did not grey out Card 3 when the card was not being used, for example when field DOF was not 9 to 11 or -9 to -11, or when field VAD was not 4. This is now fixed.

- **Case 47333**

Changed keyout version of `_FILE` option for `DATABASE_BINARY_INTFOR` from R11 to R9.

- **Case 47317**

Removed the erroneous `OPTION2=<_MODAL_CONTRIBUTION>` option for certain `DATABASE_FREQUENCY_ASCII_<Option1>` types.

- **Case 47166**

New fields `PERMY` and `PERMZ` have been added to field 3 and 4 of `*MAT_ADD_PERMEABILITY` to keyout in `PRIMER` for R12 and above keyword files.

- **Case 46669**

Extended the `VID` field for `DDAM` option for `*FREQUENCY_DOMAIN_RESPONSE_SPECTRUM` to accept values less than 0 as vector id.

## Kwd editor

- **Case 47508**

`*BOUNDARY_NON_REFLECTING_2D` fields 2 and 3 (`AD`, `AS`) were incorrectly written as floats. They have been changed to integers.

- **Case 46064**

The keyword editor will now auto-dynamically resize upon changing suffices/field values.

## Labels

- **Case 47804**

Corrected a typo in Label warning popup.

## Loadcurves

- **Case 45827**

The `DEFINE_TABLE_MATRIX` edit panel could previously, on rare occasions, display buttons corresponding to other Table types. This has now been fixed

- **Case 45818**

The Table edit panel sees the following (minor) tweak. The header for the textbox that allows entry of curves (for `TABLE` and `TABLE_2D`) and tables (for `TABLE_3D`, ..., `TABLE_9D`) now displays 'Curve ID' or 'Table ID' text as appropriate where, previously, it'd unconditionally show 'LCID'

## Macro

- **Case 47237**

The wrong macro tag was getting picked up when clicking on Measure->Node Curve->Free edge node curve. This has been fixed.

- **Case 35445**

Macro tags have been added to the pairs of listing, details and autofix buttons to distinguish them in the main checking panel.

## Manual

- **Case 45799**

Opening the keyword manual from PRIMER for \*BATTERY and \*DUALCESE keywords did not work. This has been fixed.

## Mass

- **Case 46372**

Mass property function has been corrected to ignore mass on N3 nodes of beams that are otherwise non-structural. This is consistent with Assign Mass.

## Materials

- **Case 47836**

PRIMER crashed if you imported materials from a database (MAT->Import) and then went to MAT->Modify. This has been fixed.

- **Case 47724**

The ISW field on \*MAT\_185 can be blank for non-XFEM shells, but PRIMER issued a warning. This has been fixed and PRIMER now only issues a warning if it's blank and used in XFEM shells.

- **Case 47374**

Fixed load curve selection on MAT\_ADD\_GENERALIZED\_DAMAGE LCREG3, FADEXP3, and ECRIT3 fields.

- **Case 46760**

Tabbing through the material edit panel reset the type to ELASTIC possibly losing extant data. This has been fixed so that whilst tabbing temporarily clears the entry in the type box, tabbing past it will restore the correct type and no other data will be lost

- **Case 44529**

The FN field \*CONSTRAINED\_SPR2 can be a -ve label pointing to a material, but PRIMER did not support this. This has been fixed.

## Measure

- **Case 47771**

The distance on a measurement drawn in the graphics window was initially shown as '0' until the graphics were refreshed. This has been fixed and the correct measurement value is now shown immediately.

- **Case 47147**

PRIMER's Measure->Node Curve->'Free edge node curve' option calculated the incorrect value of the whole perimeter of a curve when a node was double clicked. This has been fixed.

## Mechanism

- **Case 46651**

A mechanism with a coupler was moving the wrong way. This has been corrected.

- **Case 41821**

A mechanism could be slow to move whilst moving a connection. This has been improved.

## Menus

- **Case 47277**

There are Database scalar cards which are only permitted to have a single instance in a model. If there were multiple models open in PRIMER with all of them having one instance of these Database cards the create button would still be active. This has been fixed and the create button is greyed out and the modify button is active instead.

- **Case 46386**

It was not possible to select text in buttons within buttons, e.g. those at the bottom of the assign mass panel. This problem has now been fixed.

## Mesh

- **Case 46634**

Solid and thick shells were not always aligned with the parent triad after splitting them. This has been fixed.



- **Case 46346**

In Mesh tools > Shell > Split panel, Node selection button was not greyed out for Solid and Tshell. This has been fixed.

- **Case 39032**

Node-drag with element quality contouring turned on was slow on large models. This has been fixed.

## Model modified

- **Case 44272**

Model modified has been improved to report differences for the case where one model has an installed item and other has a latent item of the same label. This could have been missed before, depending on the way round the models are compared.

## Morphing

- **Case 46793**

Moving morphing control nodes did not update \*ELEMENT\_SHELL\_NURBS\_PATCH geometry. This has been fixed.

## Node

- **Case 46087**

PRIMER could crash when writing \*NODE\_MERGE cards, now fixed.

## Orient

- **Case 47385**

Orienting a model did not move \*IGA parts. This has been fixed so that that the orient options such as translate, rotate, scale and reflect now work for \*IGA parts.

## Parameter

- **Case 47292**

Previous versions of PRIMER could, at times, not read in implicit parameters correctly. This issue has now been fixed.

- **Case 47220**

Previously, scalar editors for the below (semi-)open-ended keywords, in which a single new entry field was made available at a time, would not class a zero-value parameter reference as

valid input and hence not create a new entry field. For these keywords, PRIMER would also ignore any open-ended fields that referenced a zero-value parameter upon reading, and so this data would be lost. These issues have now been fixed.

```
*CONSTRAINED_IMMERSSED_IN_SPG
*DEFINE_DRIFT_REMOVE
*FREQUENCY_DOMAIN_LOCAL
*IGA_1D_BREP
*IGA_2D_BREP
*IGA_FACE_UVW
*IGA_FACE_XYZ
```

- **Case 46473**

PRIMER has a limited capacity to handle character parameters used as filenames. So long as the parameter is on a line by itself this will work, so the syntax

```
*INCLUDE
pathname/ +
parameter
```

Works when an include filename is parameterised when appended to an explicit path.

However this parameterisation was lost on keyout with just the plain pathname/filename being written instead because of a rather limited way of interpreting parameters in this context.

This is now fixed and output will be in the

```
*INCLUDE
pathname/ +
&param
```

form, even if the actual pathname changes.

- **Case 46330**

PRIMER v18 added support for the processing of pseudo-expressions that take the following form:

```
*PARAMETER
R y15 z30
```

This carried the limitation that only one such expression would be processed per line as opposed to the usual limit of 4 for regular parameters.

v19 removes this limitation and allows a mix of pseudo-expressions and regular parameters to be defined on a line. So, the following would be processed correctly in v19:

```
*PARAMETER
R z30 -10.0
R x75 75.0
$R y15 x75
```

### \*PARAMETER

R y15 z30I a30 987R b49 &z30R c62 3.14

- **Case 39167**

PRIMER now correctly handles regular (non-expression) parameters that are, effectively, pseudo-expressions and take the form:

\*PARAMETER

R var2 var1

## Part replace

- **Case 46383**

A trap has been added in part replace to report any target elements which are connection entities. These cannot be deleted and suggest that the post-end connection definition has been corrupted.

## Pedestrian

- **Case 47033**

Previously, when using the N points calculation method for a leg impacts in the Pedestrian Markup tool, setting the spacing to a greater value than the number (N) of points would result in the tool breaking. This is now fixed.

## Program crash

- **Case 47966**

PRIMER could crash when screen picking knots in the \*ELEMENT\_SHELL\_NURBS\_PATCH editor if the definition was not valid. A check is now made to make sure it is valid and a warning is issued if it is not.

## Read

- **Case 47035**

If a keyword file is created (somehow...) in which the last line is not terminated by a [line feed] character then PRIMER would fail to read any content on this last line, effectively marking the file as having ended prematurely. This has been fixed.

- **Case 45654**

Fixed an issue where PRIMER would be unable to read-in or write-out a \*DEFINE\_CPM\_VENT keyword where field VANG was not -2, and values in the optional 3rd row were present. Also removed the requirement for NID values to be present when VANG=-2 in the keyword edit panel, as this is not a condition required for writing out in LS-DYNA version R9.

## Renumber

- **Case 47803**

PRIMER was getting stuck in an infinite loop when accidentally moving mouse into a white area before clicking Only/Blank/Sketch etc in the Renumber Visualise panel.

## Rigidify

- **Case 47065**

MAT77 can use a -ve Poisson ratio to change the format of the card. The applied value is positive. PRIMER's contour plotting of material properties incorrectly contoured a -ve value. Also the Rigidify function incorrectly imported the -ve value resulting in LS-DYNA initialization fail. Both these have been corrected.

## Scripting

- **Case 44250**

D3PLOT, PRIMER and T-HIS would previously allow encryption of an open (unencrypted) script that, however, refers to an already-encrypted script. No warnings would be thrown during this operation but the resulting encrypted (parent) script would be unusable. This scenario is now detected up-front, a warning thrown, and the (illegal) encryption operation aborted.

- **Case 47777**

PRIMER release scripts using pre-packaged macros have been updated to work when a user is using the new Favourites menus for Tools and/or Keywords.

- **Case 47653**

PRIMER crashed when trying to delete the model created after running the HPM script or trying to rerun the script. This has been fixed.

- **Case 45811**

Automatic timeouts have caused problems by shutting down prematurely a batch processes running a very long script when the time taken exceeds the timeout limit. To solve this the following changes have been made:

+ All of PRIMER, D3PLOT and T-HIS will now accept the command-line argument -d=batch. This has the following effects:

- No graphics window will be mapped on the display. In D3PLOT and T-HIS graphical operations such as image creation may still be performed, they just won't be visible.

- The timeouts functionality will not be active. The process will not be killed no matter how long it runs.

In addition to the above when a process is auto-terminated by the timeouts feature a message is sent to the LMX licence server log file stating:

Process name and version  
Machine name  
Process id  
Reason for auto-termination.

## Sections

- **Case 47121**

For \*SECTION\_IGA\_SHELL, \*SECTION\_SHELL & \*SECTION\_TSHELL beta angle field name boxes were greyed out, ICOMP pop-up couldn't switch from 1 to 0 and beta angle fields did not disappear for icomp=0 in the create editor. IRL, PROPT and ICOMP field pop-ups weren't implemented in kwd editor. These have all been fixed.

## Sensor

- **Case 47198**

In \*SENSOR\_SWITCH\_SHELL\_TO\_VENT the associated label while reading it into PRIMER was clashing with other labelled \*SENSOR\_SWITCHs and ABID was given a SWITCH label instead of Airbag ID. This has been fixed.

- **Case 47169**

PRIMER was replacing parameter names with the parameter value in some of the fields in \*SENSOR\_CPM\_AIRBAG. Additionally, PRIMER reported errors for some fields when they were empty even though it was valid. These have been fixed.

- **Case 47162**

In \*SENSOR\_DEFINE\_ELEMENT\_SET a blank value for <SETOPT> field was being set to 'AVG'. This has been fixed.

## Sets

- **Case 47414**

In \*CONTACT\_COUPLING illegal values could be set for stype (not in range of 0-3) if it was set with a parameter. PRIMER now reports a warning saying that the parameter value is not in range and the popup for sid is no longer available.

## Sketch

- **Case 47308**

After using reset prefs function, the sketch colour was incorrectly set to white. Now fixed.

## Speed

- **Case 45746**

Models can have 'complicated' sets which are slow to process. Typically, these are \*SET\_XXX\_GENERAL using multiple box and other computationally intensive operations which make it slow to determine what the set's contents actually are.

PRIMER tries to speed this up by building a cache of the set's contents, but obviously this has to be built in the first place and also updated as the model is modified. This cache build/maintenance process was very slow in some situations and this has been speeded up.

## Text

- **Case 47546**

Cards 3 and 2b for CONTROL\_THERMAL\_SOLVER can now be accessed with the Text Editor if Solver is set to 17, this was previously not possible.

## Transform

- **Case 47704**

Previously, when a \*NODE\_TRANSFORM card was deleted, the graphics was not getting updated. Deleting a \*NODE\_TRANSFORM card now will remove the transformation it contained and update the graphics.

## Units

- **Case 47505**

Unit conversion for fields ERATEN and ERATES was not working in keyword \*CONTACT\_AUTOMATIC\_ONE\_WAY\_SURFACE\_TO\_SURFACE\_TIEBREAK. This has been fixed.

## User interface

- **Case 47812**

Width of the Columns under View in Connection table now increased to make row text clearly visible.

- **Case 47737**

When pressing 'Recheck' in the Check panel, the cells that had errors in the previous check appeared in red. This was not correct. Now they only turn red after the recheck has taken place if errors have been found.

- **Case 47705**

After doing a model merge, it was no longer clear whether the Copy and Omit buttons on the model data panels were toggled on or off in the new user interface. The red/green colour distinction has now been improved and the panels have generally been made more consistent with the overall UI.

- **Case 47593**

In the RENUMBER SELECTED panel, the 'YES' & 'NO' buttons have been joined since they are mutually exclusive.

- **Case 46925**

The vertical dimension of the Create panel for DAMPING\_PART\_STIFFNESS was too small to show the list of parts. This has been fixed.

- **Case 46866**

The 'Read & Apply file' buttons were coloured incorrectly. This has been fixed.

- **Case 46854**

The 'List' button in the Part Tree box was not highlighted when clicking the Contents right-mouse-button popup List option. This has been fixed.

- **Case 46852**

Fixed the following issues:

1. On the DEFINE\_TRANSFORMATION editor, the +/-/^/v buttons sometimes flickered between having rounded and square corners when hovered. The buttons also reset to rounded button style when the panel was remapped.
2. On the Orient menu, the 'Consider INCL\_TRANS' label and tickbox overlapped. This causes the tickbox border to disappear and reappear when moving the mouse over one then the other.

- **Case 46851**

Labels for a few radio button boxes in Model -> Build were to the right of the box. Repositioned them to the top of the box.

- **Case 46827**

Renamed button 'Dyna' in Safety -> Dummies -> Position to 'LS-DYNA'.

- **Case 46819**

Made the radio button in the MAKE CONNECTIONS panel wider so that the 'Master Part Set' option is fully visible.

- **Case 46721**

The help button on the Rigidify panel was a regular button with the string 'help' on it, rather than the more typical '?' next to the 'X' button. Also, the panel heading string 'Rigidify' did not come up for no model or more than one models. This has been fixed.

- **Case 45990**

Fixed a bug where the drop-down menu for field CID in keyword \*ELEMENT\_MASS\_MATRIX was not opening correctly.

- **Case 45923**

PRIMER's object menus provide 'hover over' graphics which highlight in the graphics window the item(s) in the row where the mouse is currently located. For simple items the time taken to draw these graphics is effectively instant, but for more complex items it can take quite a long time to render the graphics - often several seconds.

This used to cause a problem because as soon as the mouse landed on a new menu row it would not respond to subsequent movement until all the graphics for that row had been drawn. This showed up most clearly for complex items like \*CONTACTs or \*SET\_PARTs, but it could be a problem for other types too.

This rendering process has been modified so that instead of a 'draw it all in one go' approach the code now uses repeated cycles of 'draw a little bit, then see if the mouse has moved'. This allows it to detect that the user has moved the mouse position, and if this is detected as having moved to a different row then rendering of the 'old' graphics can be ended prematurely.

All of which is a rather complicated way of saying that when scrolling through object menus of complex items the response to mouse motion should no longer be delayed.

- **Case 45919**

The items of the comboboxes in scripts sometimes had the colour that the user had specified in the background and foreground properties. However, they should have respected the category, unless they are specifically given the category NO\_CATEGORY. This has been fixed.

- **Case 45553**

The X and Y labels of the graphs in DEFINE\_CURVE was not centred, and this made them go outside the graph when it was too long. This happened when the curve was being used in multiple different keywords. Now it is always centred.



## Xref

- **Case 47068**

Some parameters used in the `*DEFINE_CURVE_FUNCTION` expression strings were not being found in the Xrefs panel list. This has been fixed.

## 2.2 D3PLOT

### Animation

- **Case 33456**

Removed MPEG-1 movie capture functionality from D3PLOT.

### Attached

- **Case 47694**

On completion of a recursive Attached operation, the 'Recursive' option is now automatically switched off.

### Blanking

- **Case 46183**

In the Propagate Properties popup menu, user can now select both the model and the window from which to propagate properties. This is important for blanking, which is stored on a per-window basis. Previously if an entity was blanked in any window, it would be propagated as blanked. Now it will only be propagated as blanked if it is blanked in the selected window. Blanking options have also been added to the Export Menu, Window Options popup and the Quick Pick popup accessible by right-clicking on a model.

### Contour

- **Case 47058**

Integrated beams no longer reset to integration point 1 when the component is changed. The default has also been changed from integration point 1 to Mag All.

- **Case 46787**

If multiple models were loaded into a Window, it was sometimes possible for a data component to be shown as 'Not Computed', even when it should have been available for one of the models. Now fixed.

### Cut section

- **Case 47903**

Fixed a crash that could occur when predictive screen picking while cut sections were used with two models of different sizes in the same window.

- **Case 47631**

In Volume III analysis, sometimes the number of nodes and elements increases in later states as the mesh is refined. When viewing a state containing more nodes and elements, a crash could occur during screen picking operations. Now fixed.

- **Case 47321**

Cut section thicknesses were sometimes offset in the wrong direction with NLOC. This happened on elements whose first node was on the positive side of the cut plane, but worked correctly when the first node was on the negative side. Now the offset is applied correctly in both cases.

- **Case 47120**

Fixed an issue where the wrong cut plane position was used when cut section definitions were changed with the JavaScript API function SetCutSection and then the intersection of elements was calculated with GetCutCoords.

## D3PLOT Viewer

- **Case 47832**

When exporting an animated contoured model to GLB for D3PLOT Viewer, D3PLOT switches to the safer 'scan every state' mode to ensure the contour bar shows the correct max and min values for the full animation. If D3PLOT wasn't already in this mode when export began, it will switch back once the export is complete. A message to the dialogue box was missing when this happened, to make it consistent with Movie output, so this has now been implemented.

## Data components

- **Case 47074**

Fixed a crash that could occur when plotting a stress-based data component if an OP2 file was read that did not contain stresses for all elements.

## Dialogue command

- **Case 47878**

The dialogue command for setting the colour of an entity '/PROPERTIES COLOUR' didn't work if the colour was LIGHT\_GREY. Now fixed.

## Filtering

- **Case 47858**

If the file filter was set to 'D3ATV Files' in the Open Model menu and a folder contained both a d3atv and d3atv.ptf file, then the file selector would select both files when the d3atv file was selected. This only happened on Unix operating systems and has now been fixed.

## Graphics

- **Case 47943**

If different data components were plotted in a session and then within the same session the model was re-read, then in some cases if the same data components were plotted again some elements could disappear from the plot. Now fixed.

- **Case 47847**

Fixed a bug where, when using limiting values, choosing an action for Excluded of Outline or Draw in hidden colour after selecting Omit, and then hovering over the graphics window before pressing CT to update the plot, could cause only parts with visible data values to be shown in Outline/Hidden Colour (with the rest omitted).

## Groups

- **Case 48023**

When the predictive picking mode is set to Groups, trying to dynamically rotate a model with lots of groups is slow and could cause D3PLOT to freeze. This has now been resolved.

## Image

- **Case 47652**

In previous versions of D3PLOT, if the program was started with the '-batch' option then hardware shaders were switched off.

Now, the default behaviour has changed and hardware shaders are now used by default in batch mode.

A new preference has also been added that can be used to change the default behaviour if required:

d3plot\*batch\_mode\_use\_shaders

This can be set to TRUE (default) or FALSE.

## Integration

- **Case 47677**

Fixed an issue where the sync options in D3PLOT were automatically being refreshed to enabled (tick boxes checked) when a PRIMER link was created.

- **Case 47381**

When D3PLOT was linked to REPORTER, if you pressed the Resize button on W1 and then right-clicked the Capture button on W2, and selected an output type, the wrong window (W1) would be captured. Now fixed.

- **Case 47272**

Fixed various issues associated with the synchronisation of model properties shared between linked PRIMER and D3PLOT sessions.

## JavaScript API

- **Case 47199**

The JavaScript API function GetCutCoords returned incorrect coordinates when a cut section had been defined in deformed space and the function was called with a state\_id argument different from the state selected interactively. Now fixed.

- **Case 47186**

Fixed a crash that could occur if GetData or GetMultipleData were used to extract Solid Extra (SOX) or Shell Extra (SHX) data without specifying the 'extra' argument.

- **Case 46660**

Fixed an issue where the JavaScript API function GetCutSection could incorrectly return a previously used node instead of an origin coordinate in nodes[0].

- **Case 45911**

The ability to get the program version was added to D3PLOT and T/HIS, and the script failure\_plot.js included with D3PLOT has been updated to load the PRIMER executable automatically.

- **Case 45789**

Documentation has been added for Utils class for D3PLOT.

## Materials

- **Case 47535**

Support has been added for \*MAT\_280 (\*MAT\_GLASS) extra history variables (additional material properties added to d3plot\_library/matprop/mat\_prop.csv).

## Measure

- **Case 47630**

If a node or point was selected for a measurement and then the shift button was pressed to rotate/translate the model, the picking mode reverted to quick pick rather than to the measurement picking. Now fixed.

- **Case 47097**

The Measure constructor caused crashes when called with invalid combinations of models and windows. Now it shows a more meaningful error message saying what has gone wrong.

## Memory

- **Case 48105**

Fixed a crash that could occur if a model was loaded that included \*LOAD card definitions (read from the ZTF file) and the system was very low on memory.

- **Case 47861**

The virtual memory consumption bar in the Memory panel in D3PLOT now shows a sensible measure of total virtual memory consumption on the system. The original coding was out of date and did not show useful information on Windows 10.

## Menus

- **Case 47986**

Fixed some refresh issues in the Colour menu that could occur if you had multiple windows open.

- **Case 47622**

Improved animation performance while the Measure panel is open by now only updating the measurement values displayed when the animation frame rate is 10 fps or lower.

## Movies

- **Case 47605**

Support for MPEG is now deprecated. MP4 is recommended instead.

## Program crash

- **Case 47649**

Fixed a crash that could occur when trying to select a point in an FLD Plot graph before the FLD Plot button had been pressed.

## Properties

- **Case 47730**

Fixed a bug where the Overwrite, New File and Help buttons were not being hidden after clicking New File when a file with the same name already existed.

## Read

- **Case 47944**

The default value for the file\_skip was changed from 5 to 50.

- **Case 47291**

Fixe a crash that could occur when using the -ml=filename command line with certain model list files. In general an integer can be added at the end of each line with a filename to say which window(s) the model appears in. The meaning of that integer is bitwise, with 1 for window 1, 2 for window 2, 4 for window 3, 8 for window 4 etc. The crash in D3PLOT happened when that integer after the filename was 7. Now the model is correctly read into windows 1, 2 and 3.

- **Case 47170**

If multiple models were opened and a beam integrated component was plotted with the integration point set to max, min, mag or ave, and then a model was closed, D3PLOT could crash. This has been fixed.

- **Case 46952**

A new preference has been added that allows you to set the value of file skip. This is in addition to the existing FILE\_SKIP environment variable. The environment variable takes precedence. Example of its usage:

```
d3plot*file_skip: 10
```

This sets the file skip value to 10.

## Selection

- **Case 47857**

It is now possible to quick-pick internal solid elements exposed by a cut section.

- **Case 41951**

The logic used to pick items via Quick Pick or from within most menus has been re-written so that it now uses the same logic and code as the Object menus used in Blank, Write, XY-Data.

## T/HIS link

- **Case 47883**

On Linux, when trying to open the D3PLOT-T/HIS link while a JavaScript Window was active, the T/HIS Dialogue window and Graphs did not get properly positioned on the screen. Now fixed.

## Template files

- **Case 47932**

If a user-defined colour was used to set the model colour in Window → Edit and a template file was saved, the file would write incorrect data. Now fixed.

## User interface

- **Case 47931**

The colour palette window could close before you had a chance to edit a user-defined colour if you didn't move your mouse over the window quickly enough. Now fixed.

- **Case 47481**

Error messages written to the D3PLOT and T/HIS dialogue windows are now printed in full, consistent with PRIMER.

- **Case 47231**

Fixed a menu refresh issue with the overlay colour button in the Display Options panel.

## Utilities

- **Case 47344**

Fixed a crash that could occur when screen-picking a part or elements for the die closure workpiece.



## Variables

- **Case 47840**

When capturing a D3PLOT object with variables from a multi-model session to REPORTER using the pre-v17 method, you could see an error message ‘In <d3\_set\_current\_window> window\_num 0 invalid’. Now fixed.

## XY plot

- **Case 46926**

Fixed a bug where ‘Export ALL to XY\_PLOT’ caused the program to hang and display an error message.

## ZTF

- **Case 47394**

LS-DYNA allows beam spotwelds using \*MAT\_SPOTWELD to be converted automatically to solids by setting the RPBHX flag on \*CONTROL\_SPOTWELD\_BEAM. With this flag set, LS-DYNA deletes the beams from the model and replaces them with solids.

D3PLOT can display these spotwelds if a ZTF file is present, but to do so it has to work out from the beam information in the original keyword input file which solid elements (which are not present in the input) will actually be created by LS-DYNA.

This was being done incorrectly, with the result in most cases that the spotwelds were simply not shown. However if the option to display spotwelds using the underlying solid elements was switched on, D3PLOT could crash.

This has been fixed and these spotwelds now display correctly both as spheres (the default display mode) and as the underlying elements if that display method is chosen instead.

In addition, if a beam set BMSID on \*CONTROL\_SPOTWELD\_BEAM was used to restrict the conversion of spotweld beams to only a subset of beams, this too was not working properly and could cause a crash. This has also been fixed.

## 2.3 T/HIS

### FAST-TCF

- **Case 47658**

When reloading a T/HIS item from REPORTER into D3PLOT, if there was no active linked T/HIS session, D3PLOT would display an error message ‘Playback ('command') file not found’. This has now been fixed.

### Help

- **Case 47541**

Added Help text for WIF operation.

### Integration

- **Case 47383**

T/HIS items defined as fixed size in REPORTER were not resized correctly in interactive mode and when generating. Now graphs in T/HIS are resized correctly. If the specified size is greater than the available resolution, the specified size is treated as an aspect ratio and the size of the graph is maximised within the available resolution.

### JavaScript API

- **Case 47368**

If a JavaScript was run in T/HIS that created a GUI and restricted input using the modal option, then if a Curve.Pick() or Curve.Select() operation was started it wasn't possible to select a curve in the Graph on the first attempt. Now fixed.

- **Case 47326**

PRIMER, D3PLOT and T/HIS could crash if a script that used a GUI created with the GUI Builder was run in the debugger. Now fixed.

- **Case 47149**

Running a JavaScript that had a GUI created from the GUI Builder would write an error message (‘Cannot find script to remove from script stack’) to the dialogue box when the script finished. Now fixed.

- **Case 45790**

JS API documentation added for Utils class for T/HIS.

## Macro

- **Case 47747**

T/HIS was not collecting correctly values with upper-case characters for some of the command line arguments. Now fixed.

## Operations

- **Case 47506**

When trying to stop FFT and IFFT operations over multiple curves, T/HIS would only stop for the curve that was currently being processed and would continue onto the next curve in the selection. Now, the entire operation is stopped.

## Pages

- **Case 46728**

Made corrections to the Page.Layout function to support “xy” layouts properly.

## Read

- **Case 45930**

Fixed an issue where some binout output branches (such as SECFORC) were not being read into T/HIS correctly because the internal directories (e.g. /secforc/d000001, /secforc/d000002, etc.) were not being incremented by one but by much larger values in some instances.

## Variables

- **Case 47984**

T/HIS items in REPORTER with variables defined in the FAST-TCF script could lose the variables when the items were generated. Now fixed.

## 2.4 REPORTER

### Animation

- **Case 45908**

When hovering over an animated Item with the Hand tool, forcing a page switch using Generate or switching to Design View using the 'p' shortcut would cause the hover controls to remain on screen unintentionally. Now fixed so that hover controls no longer persist.

### Edit

- **Case 47791**

Fixed an issue in which pre-existing D3PLOT and T/HIS items of Blank type were not being given a new default image filename when changing type.

- **Case 46932**

When converting an item from one type to another, it is now possible to preserve the item's name.

### Image

- **Case 47780**

The default image name for a new T/HIS item is now incremented correctly to provide a unique name.

### Installation

- **Case 39730**

REPORTER now respects the OA\_INSTALL\_xx environment variable (taking precedence over OA\_INSTALL environment variable, but not oasys\*install\_dir oa\_pref option).

### Integration

- **Case 43178**

When an error occurs during report generation, or when a Script item calls Window.GetOptions, the Logfile or options window is now brought to the front of your display (or the icon on the taskbar will flash, depending on what is permitted by your operating system). This helps notify you that action is required, especially when a PRIMER, D3PLOT or T/HIS session may have been launched in front of REPORTER, temporarily obscuring it.

## JavaScript API

- **Case 47338**

Previously, setting the font property of an Image item to a font family name that was not available in REPORTER would result in an exception being thrown. Now, the font name is mapped to the best available match in REPORTER.

## Manual

- **Case 45812**

Fixed a crash that occurred while launching the HTML manual through the Help menu on Unix systems. Updated code for launching HTML manual to work with a wider range of default browsers on Windows.

## Standard templates

- **Case 47962**

Corrected an issue with the head impact templates that meant that some items were not generated until after the report, PDF, HTML or PowerPoint had been written.

- **Case 47829**

Fixed some issues preventing the MPDB Compatibility Assessment templates from working with the LSTC MPDB model. You will still need to make modifications to the template scripts. See REPORTER → Help → Additional user guides → Euro\_NCAP\_MPDB\_Compatibility\_Assessment\_REPORTER\_Instructions.pdf for details.

- **Case 47813**

The MPDB Occupant Assessment templates now calculate Humanetics THOR 50M v1.8 chest deflection from the relative displacement between IR-TRACC nodes rather than from spring elongation. If you have already saved a CSV file with input parameters, you will need to update it to use the IR-TRACC nodes.

- **Case 47188**

Fixed an issue preventing the MPDB Compatibility Assessment templates from working with a renumbered Arup Cellbond MPDB Shell Model. A renumbered barrier model should now work as long as a ZTF file is present alongside the results files. If you are unable to produce and use a ZTF file, you can use 'Option 2' in reporter\_library/templates/scripts/MPDB/d3plot\_MPDB\_barrier\_parts\_blanking.js and enter the renumbered part IDs.

- **Case 44618**

The position of the barrier deformation plots in the MDPB Compatibility Assessment templates has been adjusted to reduce unwanted cropping.

- **Case 42836**

In many of the templates, the T/HIS graph legend text could become clipped if the labels were longer than the column width. This has been fixed by switching the legends from two columns to a single column.

## User interface

- **Case 43343**

Support for high-DPI displays has been improved. Text, icons, and widgets should now scale up in size appropriately when REPORTER is used with a high-DPI display. Windows Display scaling settings are respected for integer values.

## 2.5 SHELL

### Read

- **Case 47681**

Fixed a crash that could occur in PRIMER, D3PLOT and T/HIS if the Checkpoint directory mentioned in the Options panel was not available.

## 2.6 Oasys

### Installation

- **Case 43703**

The installation directory for the software could be set incorrectly if any of the executables were started using a relative command and the absolute path was found using the PATH environment variable. Now fixed.

### Preferences

- **Case 45460**

Historically, all Oasys LS-DYNA software had defaults to map the main window initially at ~70% of the screen size, but we shipped a default oa\_pref file which overrode this to launch the software in a maximised window.

From Oasys 19.0, the default is now to start maximised. Users wishing to revert to the initial smaller size will need to set the preference:

```
<code>*maximise: false
```

where <code> is one of PRIMER, D3PLOT etc. or OASYS for everything.



## 3 Enhancements

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

### 3.1 PRIMER

#### Adhesive

- **Case 45042**

Adhesive connections can now be created directly from solid faces. A grid is formed from the selected segments which (by default) will be adapted to give a quad bias, this will then be extruded to form a hexa biased adhesive. In this context, the object menu supports selection and removal from selection of segments.

#### Bom

- **Case 44297**

Added PART\_CONTACT option and fields (FS, FD, DC, VC, OPTT, SFT, SSF & CPARAM8) to Bill of Materials.

#### Checking

- **Case 47322**

If a model where CNTCO is not set on \*CONTROL\_SHELL, has \*SECTION\_SHELL with NLOC or \*ELEMENT\_SHELL\_OFFSET, the offset will not apply to the contact surface. As this is likely to be a modelling error, a model check warning is now issued.

- **Case 46545**

A warning message has been added for models containing NLOC or \_OFFSET on shells when CNTCO on control shell is unset. This may be deliberate, but it is more likely that the user will lose the expected offset on the contact surface. Note the PRIMER check does not actually test that the shells concerned are used in a contact.

- **Case 44841**

Custom JavaScript checks using Japanese characters now display correctly.

#### Comments

- **Case 45306**

New class 'Comment' added to JavaScript to access \*COMMENT.

- **Case 45241**

PRIMER has always 'anchored' the \*COMMENT keyword to the (single) next keyword in the input deck, so that the association between comment and following keyword is not lost.

This logic has been extended to 'multiple anchoring' in which multiple items following the \*COMMENT card can now be associated with it. Specifically in the sequence

```
*COMMENT
Comment lines
*keyword
item 1 }
item 2 } All the items 1 to n between the two successive
      : } *keyword headers are associated with the *COMMENT
item n }
*keyword
```

## Contacts

- **Case 46174**

A tool has been added to the contact checker that for a single-surface contact which uses exempt part set (sstyp=6) removes the crossed elements from the contact. It moves the element with highest part label into a new part and inserts that into the exempted set.

## Crash test setup

- **Case 46477**

Car crash test setup script updates:

-Updated the list of load cases as follows:

- (1) EuroNCAP full width frontal impact -> New test
- (2) EuroNCAP oblique pole side impact test -> Updated the test settings and barrier alignment
- (3) UN-ECE R32 rear impact rigid test -> Name and display image corrections
- (4) EuroNCAP Frontal Impact -> Default barrier changed to a simplified Mobile Progressive Deformable Barrier (MPDB)
- (5) IIHS Side Impact -> Impact velocity updated to 60km/h

-Added the option to rescan the model using the 'Restart' button in the main Window

-Added the option to run 'Left' and 'Right' impact setups simultaneously by selecting both 'Left Impact' and 'Right Impact' in the test settings panel

-Added the option to write the created \*Keywords to an existing or newly created include file through the 'Write Keywords' pop-up window after pressing on the 'Go' button

-Combined all rotations and translations in \*DEFINE\_TRANSFORMATION to result in one line for rotations and one line for translations whenever possible

-Added the option to manually select or create a contact card in the barrier settings panel

-Other minor enhancements

## Curve menu

- **Case 45951**

The (increasingly tall) radio button in the DEFINE\_CURVE edit panel that's used to choose between different CURVE and FUNCTION subtypes has been replaced by a popup. The same has been done for the DEFINE\_TABLE edit panel.

## Cut section

- **Case 20223**

PRIMER19 now supports cut planes in up to 3 different directions. Each direction has its individual set of Positive and Negative actions with two different modes to select from: Union and Intersection.

## Database

- **Case 45825**

A new 'Only visible' option has been added to the \*DATABASE\_CROSS\_SECTION edit panel. This option is ON by default and determines whether blanked entities are included in the creation cross section planes.

Previous versions of PRIMER were somewhat inconsistent in the treatment of blanked entities. This new v19 option rationalises this behaviour.

## Deleting

- **Case 46476**

The default connection option for deletion is empty. If a user elects to leave connection items (such as solid welds) the deletion process was blocked. This has been changed so the deletion will instead proceed with no action for connections.

## Encryption

- **Case 46490**

The following updates have been added to the Encryption Tool:

- The user can now add a comment line on encrypted data.
- The user can now specify a start line for where data will be encrypted using Partial Encryption.

- The user can now specify the expiration date of encrypted data.
- A new preference has been set up so that PRIMER remembers the location of the GPG executable so that each time the tool is ran you do not have to find the file manually.

- **Case 46295**

A PGP block below a material keyword was always being associated with the material even if all the material values had been defined.

If the first line of the block says 'Comment: PRIMER Full Encrypt' PRIMER will now treat it as independent encrypted data.

## IGA

- **Case 47415**

Added degree increase/decrease functionality in IGA Refine panel.

Added sketch functionality for IGA\_1D\_BREP (trimming loop).

- **Case 47412**

Added Refine panel through which user can visualise knot grid and inserting new knot values for new \*IGA keyword.

- **Case 47286**

\*IGA is supported for contact check and connection (weld and adhesive) creation with the same methodology used for \*ELEMENT\_SHELL\_NURBS\_PATCH.

## JavaScript API

- **Case 47411**

Methods and properties to create and edit \*DEFINE\_CURVE\_SMOOTH have been added to the JS-API class "Curve".

- **Case 47072**

The special encoding comment in a script now supports ShiftJIS as an encoding.

- **Case 46742**

API additions to CONTROL\_MPP\_DECOMPOSITION\_TRANSFORMATION.

- **Case 46665**

Added JavaScript API function Colour.GetFromName returning the colour value (as integer) for a given core colour or user-defined colour.

- **Case 46390**

A new Evaluate method has been added to the Parameter class to be able to evaluate parameter expressions in a script.

- **Case 46389**

Added new JS class for \*DEFINE\_HEX\_SPOTWELD\_ASSEMBLY.

## Mesh

- **Case 45575**

Thick shells can now be split like solids.

- **Case 44870**

'Post processing' steps have been added to HAZ spotweld meshing to improve mesh quality by remeshing large areas and also adding local mesh modification improvements. The following two post processing options are available in Connections Table-> Options:

1. HAZ mesh reconstruct: In this option, PRIMER will remesh the elements around all the selected spotwelds in the model simultaneously to improve mesh quality by reducing tria density.

2. HAZ tria reduction: This is a second operation to reduce tria density. PRIMER loops through all the elements and tries to merge trias to further reduce their number.

The meshing routines have been parallelised to speed up the process.

- **Case 43743**

In the mesh geometry panel a user can now drag a box around nodes/edges to select/deselect joined edges or vertices.

- **Case 43584**

Mesh Offset command caused skewness and/or roundedness at the corners. Fixed now.

- **Case 38129**

An option has been added to set a user defined minimum element length/maximum length for meshing. You can access the meshing options from Options->'Program Option'->Meshing and select 'user defined meshing parameters'.

Multiple PARTs and domains can now be meshed together using Meshing->Remesh Area option.

## Model build

- **Case 47075**

Made the 'Template' column of the 'MODEL BUILD PANEL' wider.

- **Case 46717**

Model build from keyword files tools has been improved so when the user presses apply, a new model is always built, i.e. we never try to build into an existing model.

## Parameter

- **Case 43520**

Enabled field TYPE in \*CONTROL\_MPP\_DECOMPOSITION\_TRANSFORMATION to accept parameters.

## Penetrations

- **Case 47064**

A new tool (contact tree) has been added under contact Pen Check (also under Check). This gives a graphical display of contact condition similar to the text output of 'Summarise all'. All contacts with crossed edges/penetrations/untied nodes are listed. The contacts can be edited/pen checked directly off the tree.

## Performance

- **Case 45443**

Error messages added for \*INITIAL\_STRESS\_SECTION when:

- part set <psid> does not contain any valid solid parts
- database cross section <secid> does not cut any elements of the solid parts in part set <psid>

- **Case 45435**

Added triad size options to the 'Display Options' panel.

- The 'minimum factor' controls the minimum size of triads
- The 'scale factor' scales the triad size

- **Case 45434**

The graph area as well as other buttons on the DEFINE\_TABLE edit panel will now automatically scale (expand) as the window is dragged wider or taller.

- **Case 45432**

A switch 'check for item in different include' has been added to the front panel of Model Modified. The options for Part and Connection comparison are now OFF by default.

- **Case 45430**

For Merge -> Apply -> Custom merge -> Basic model data. A new '?' button is added for each type. It will generate a panel that lists all clashing items of the relevant type and allows users to 'Sketch all' & 'Only all' items on the panel as well as 'Blank', 'Unblank', 'Only', 'Sketch' & 'Edit' each individual item.

- **Case 45429**

Improvement of the performance of the LS-DYNA output reader. Now the output files are not always re-read when re-loading the treeview (which is slow). They are only re-read if any of them has been modified.

- **Case 45424**

Some changes to renumber panels:

- Visualise panel (include mode): changed format of include ID from 'I xx' to '(xx)'
  - Renumber includes panel: added include ID '(xx)' before file name + left justify the file name column
  - Renumber includes panel: adjusted the width of the file name column according to the longest file name. If the file name is too long, it's truncated to fit the column.
  - Visualise panel (include mode): If file name is too long, truncate it to fit the column.
- Functionality improved to deal with different fonts and font sizes.
- Renumber contents panel: Increase width of columns to accommodate large labels
  - Renumber selection panel: The width of the 2nd column will increase when large labels are detected. Decrease the increment slightly to reduce waste of space.
  - Renumber includes panel, sort options: Changed 'Retain original order' to 'Sort by include ID', added 'Sort by alphabetical order' and changed the sort text displayed from 'Sort by ...' to 'Sorted by ...' for clarity.
  - Renumber includes panel: remove 10-row limit so we can see as many in the list as the panel will allow on panel resize
  - Renumber includes panel & Visualise panel (include mode): add visualisation (Blank, Unblank, Only) drop-down for master & include files

- **Case 44626**

Remesh area tool in PRIMER was remaking all connections on the target part. In v19 only connections where the mesh has changed are remade.

- **Case 44571**

On completion of recursive find attached, the recursive option is now switched off.

- **Case 44553**

The Oasys suite software has always had the option to open 'maximised' on the desktop, but this has suffered from two problems.

Problem #1 was that for historic reasons the default in the software itself was *\*not\** to open maximised, yet we made this the de facto default by shipping with a preference 'oasys\*maximise: true' in the standard oa\_pref file which specified opening maximised.

This inconsistency is now removed: the software will open maximised by default, even if that preference is removed. It is still possible to open at a reduced size (about 70% size, north east justified on the display) by setting preference 'oasys\*maximise: false'

Problem #2 occurred only on Windows platforms:

- + Open an Oasys application in a maximised state.
- + Moved another window partially in front of the Oasys window.
- + Move the mouse (no click required) into the Oasys window

... and the Oasys application would jump in front of the other window. This only happened once per session, the first time the sequence above was performed, thereafter the window stacking order would not be changed.

This was caused by the way a maximised window was first mapped, causing the Windows operating system to be a bit confused about its status. This has now been fixed.

- **Case 44552**

The connection panel now offers update levels. 'Full recheck' (default), 'Reduced recheck' and 'No check'.

If data is changed in the model, the connection status may be out of date so a 'Full recheck' is the safest option. However, if this is proving too slow, less rigorous options are now available.

- **Case 44550**

Added a new 'Go to label' menu in the Keyword editor, used to automatically jump the scroll bar to the row of the labelled entity of choice.

## Sensor

- **Case 45045**

Added a preference 'sensor\_keyout\_pattern' to switch between 'coupled' and 'normal' way of keyout for \*SENSOR.



## User interface

- **Case 47895**

Two Favourite menus have now been added to PRIMER, one for Tools and one for Keywords. These menus can be populated with extant Tools or Keywords that users are interested in an order that they prefer. Both menus can be populated either using preferences or by clicking the respective 'Custom...' buttons.

The Favourites menu for Tools can contain any button from the Tools menu, including sub-tools such as Tools->Safety->FMH->FMH Markup.

The Favourite menu for Keywords can contain any top level keyword from the 'Volumes I & II' and 'Volume III' tabs. Popups are mapped on buttons to allow users to access sub-keywords such as BOUNDARY\_PRESCRIBED\_MOTION.

- **Case 45925**

When interactive panels have been reconfigured, changing the button layout, we had a problem that macros recorded on the old panel would probably not work in the new because their buttons had disappeared or changed too much.

PRIMER has been enhanced so that the old buttons that are no longer visible are still remembered. This means that they are in fact still there, just not visible, and while they can't be clicked on interactively old macros that use them stand a much higher chance of working.

(This is not a panacea: if a panel changes drastically it may not be possible to retain old functionality, but it should help.)

- **Case 43027**

The radio buttons at the top of the DEFINE\_CURVE and DEFINE\_TABLE panels indicating curve and table types have been converted to drop-downs (popups).

- **Case 42785**

The old Quick-Find button has been made more prominent in the form of a Search bar located in the top menu bar. The existing shortcut key (#) can still be used. Search options can now be controlled from Options → Program Options → Search.

## User defined

- **Case 42000**

The old colour popup in PRIMER has been replaced with the new colour popup which we have currently in D3PLOT and T-HIS. Users can either choose an existing core colour or create their colour from the palette. The user defined colours can also be saved and read back.

## 3.2 D3PLOT

### Airbag

- **Case 44945**

D3PLOT 19.0 has been updated to handle the new data component 'Ratio PA' that is written to the CMPFOR file for particle airbags by LS-DYNA R11.2.2 onwards.

Support has also been added for two further (undocumented) data components, believed to be Pressure + and -.

### Animation

- **Case 43069**

The way that images and movies are captured in D3PLOT has changed. Previously if you created an animation in D3PLOT and then captured it as a movie, if you then went back to play the animation again, D3PLOT had to rebuild the animation again. Now, D3PLOT no longer has to rebuild the animation and can play it again immediately.

This change does not apply when generating output for D3PLOT Viewer.

### Cut section

- **Case 44575**

When dragging cut planes with the middle or right mouse button for rotation, often the direction of the rotation was unexpected. In D3PLOT 19.0 this behaviour is now consistent with dragging cut planes in PRIMER.

- **Case 41554**

D3PLOT now supports cut planes in up to three different directions. If more than one direction is defined, D3PLOT 19.0 draws the intersections of each plane with the model simultaneously, whereas the drawing actions on the positive and negative actions for each plane default to Omit.

### Data components

- **Case 46119**

New data components have been added for yield utilisation factor and yield utilisation percentage.

## Image

- **Case 47367**

D3PLOT exports true beam sections to D3PLOT Viewer if these are switched on during export.

## Integration

- **Case 47372**

Now, when you open a template in REPORTER, if the saved values of DEFAULT\_DIR and DEFAULT\_JOB are empty or default, and if REPORTER was launched from D3PLOT or T/HIS in a linked session, then the values of DEFAULT\_DIR and DEFAULT\_JOB are updated to match the path and filename of the current model open in D3PLOT or T/HIS. This means that when capturing items from D3PLOT and T/HIS into templates, the variables will be used in place of hardwired paths (previously you would have had to edit those manually). This makes it easier to run the template on multiple different models.

## JavaScript API

- **Case 46666**

The function Colour.GetFromName has been added. It returns the colour value (as an integer) for a given core colour or user-defined colour.

## Menus

- **Case 45479**

Colours can now be set by include on the Part Tree and Properties menu similarly to the colours by include available in Quick Pick.

Colours can now also be set by model in all these menus.

Furthermore, in Part Tree, Properties and Quick Pick menus, colours for parts and elements can now be set by material, by section or by assembly.

- **Case 44984**

The full range of colours is now available for Target Marker via a new colour popup menu in the Utilities → Target Marker menu.

## Performance

- **Case 46553**

The options used to arrange windows and pages in both D3PLOT and T/HIS have changed significantly. The order of D3PLOT Windows and T/HIS graphs can now be controlled on each page. Where windows share a common border, it is now possible to drag that border and resize

all of the windows attached to it at the same time.

For more details on these changes please see the New Features PowerPoints and the user manuals.

- **Case 44576**

The way that images and movies are captured in D3PLOT has changed. Previously if you created an animation in D3PLOT and then captured it as a movie, if you then went back to play the animation again, D3PLOT had to rebuild the animation again. Now, D3PLOT no longer has to rebuild the animation and can play it again immediately.

This change does not apply when generating output for D3PLOT Viewer.

## Selection

- **Case 12172**

The Quick Pick selection methods now include options to pick by polygon or by circle as well as by the default rectangular window.

## User interface

- **Case 47814**

The old Quick-Find button has been made more prominent in the form of a Search bar located in the top menu bar. The existing shortcut key (#) can still be used. Search options can now be controlled from Utilities → Search Opts.

## User defined

- **Case 46600**

When plotting user-defined data from .ubd files, if the user had the `ubd_file_location` preference set and valid data in the directory it was pointing to, but also valid data in the model directory, data would be set to 0 for all states.

Now, D3PLOT can correctly read data from both locations. In the case where components with the same name exist in both locations, data from the location specified by the preference will take priority, but a warning will be displayed so it is clear what has happened.

## 3.3 T/HIS

### Database

- **Case 43346**

Added support for 15 new data components in the Discrete Beam Menu from the DISBOUT file. Modified the labels to show local co-ordinates.

### Integration

- **Case 47373**

Now, when you open a template in REPORTER, if the saved values of DEFAULT\_DIR and DEFAULT\_JOB are empty or default, and if REPORTER was launched from D3PLOT or T/HIS in a linked session, then the values of DEFAULT\_DIR and DEFAULT\_JOB are updated to match the path and filename of the current model open in D3PLOT or T/HIS. This means that when capturing items from D3PLOT and T/HIS into templates, the variables will be used in place of hardwired paths (previously you would have had to edit those manually). This makes it easier to run the template on multiple different models.

### JavaScript API

- **Case 46667**

The function Colour.GetFromName has been added. It returns the colour value (as an integer) for a given core colour or user-defined colour.

### Menus

- **Case 45232**

Made changes to colour popup visibility for consistency with D3PLOT.

- **Case 45014**

Added a help button to the user colour popup.

### Operations

- **Case 46420**

A Bessel filter operation has been added to T/HIS.

- **Case 43729**

Included in T/HIS 19.0 as a JavaScript is the MADM Correlation Tool. The minimum area discrepancy method (MADM) is ideal for correlation between LS-DYNA simulations and

physical tests when force versus deflection is the relationship of interest, and offers benefits over other correlation methods that focus on parameters versus time. The MADM Correlation Tool was developed in collaboration with the University of Coventry.

## Read

- **Case 42578**

Added support for Mass and inertia components for both binout and Ascii sstat output.

- **Case 47175**

Added support for JNTFORC output from LS-DYNA R13 onwards. Main updates include support for cylindrical joints when read via LSDA or ASCII.

## User interface

- **Case 47815**

The old Quick-Find button has been made more prominent in the form of a Search bar located in the top menu bar. The existing shortcut key (#) can still be used. Search options can now be controlled from Options → Settings → Search.

- **Case 42292**

The Images menu has been made more consistent between D3PLOT and T/HIS.

## Write

- **Case 45672**

Limited support for reading HDF5 format files is now available.

T/HIS is now able to read in HDF5 files which contain either Atomic Float datasets or Compound datasets that contain Floating point data. Data can be selected interactively and plotted either against Index or against another column of data within the HDF5 file.

Please note that FAST-TCF, JavaScript and support for writing HDF5 files is not currently implemented but we are looking to support this further in a future release.

## 3.4 REPORTER

### Error trapping

- **Case 39802**

We have improved the handling of errors and warnings when generating content in REPORTER. Previously, you had to decide whether to stop generating the report before being able to see the error message. Now, you get to examine any errors and warnings before deciding whether to proceed.

When generating a report, if an error is encountered, the Logfile window will now appear immediately. This gives you the opportunity to examine the error before choosing whether to 'Stop', 'Continue' (Logfile will reappear if another error occurs), or 'Continue to end'.

You can now navigate up and down through the errors and warnings in the log file using the controls provided.

You can prevent the Logfile window from appearing when an error occurs by unchecking 'Check for errors during report generation'. In this case, you will still be asked at the end of generation if you would like to inspect the log file.

Also, the following options are now automatically saved to your REPORTER preferences upon selection:

- Include debug information from PRIMER, D3PLOT, and T/HIS
- Don't automatically exit from PRIMER, D3PLOT, and T/HIS after item generation
- Check for errors during report generation

### Integration

- **Case 44209**

Now, when you open a template in REPORTER, if the saved values of DEFAULT\_DIR and DEFAULT\_JOB are empty or default, and if REPORTER was launched from D3PLOT or T/HIS in a linked session, then the values of DEFAULT\_DIR and DEFAULT\_JOB are updated to match the path and filename of the current model open in D3PLOT or T/HIS. This means that when capturing items from D3PLOT and T/HIS into templates, the variables will be used in place of hardwired paths (previously you would have had to edit those manually). This makes it easier to run the template on multiple different models.

### Preferences

- **Case 16729**

Drive mapping support has been added to REPORTER and can be controlled using the oasys\*drive\_? oa\_pref settings.

## Scripting

- **Case 47275**

Unlike PRIMER, D3PLOT and T/HIS, REPORTER does not support the Use function, or JavaScript modules. To help address this, a new ‘Script File’ item has been added to REPORTER. Script File items have all the features of Script items, except that rather than containing an embedded JavaScript, they point to an external script file. This allows you to edit the script in your preferred editor. Furthermore, since the REPORTER JavaScript environment persists for the duration of the REPORTER session (and is shared by all scripts), you can now create one or more Script File items containing any common functions, followed by one or more Script File items that use those functions. This should provide much of the benefits of the Use function and JavaScript modules available in PRIMER, D3PLOT and T/HIS.

## Standard templates

- **Case 47989**

In the head impact templates, to improve integration with the PRIMER HIC Area Calculator tool, additional comment lines are now written to .blob files, containing the absolute path of the cur file as well as keyword paths in the data lines.

- **Case 46895**

REPORTER 19.0 comes with the new IIHS Side MDB Impact 2021 template, which follows the IIHS Side Impact 2.0 protocol and rating guidelines. There is also a Structure Only version of the template that can be used when occupants are not present in the simulation.

- **Case 46894**

The IIHS Front ODB and SOB templates have been updated to the latest 2021 protocols.

- **Case 46036**

REPORTER 19.0 comes with the new Euro NCAP Far Side Impact 2022 template, which follows the Far Side Test and Assessment Protocol v2.1.1.

- **Case 42950**

REPORTER 19.0 comes with an ICFD Assessment library template, which can be found in the new ICFD tab. The template is designed to be used with the ICFD Setup tool in PRIMER.

- **Case 42245**

The Euro NCAP Side MDB and Side Pole templates have been updated to the latest 2022 protocols (AOP v9.1.3). The templates also have a new option to output a CSV file containing maximum intrusion data required by the new Far Side Impact template.



## 3.5 SHELL

### Menus

- **Case 37087**

Added hover text strings for various panels widgets in SHELL to explain their functions better.

### Preferences

- **Case 47527**

Added new preferences to set up the default LS-DYNA executable - 'default\_ls\_dyna\_executable'.

Also added another set of preferences to setup default MPI type and its executable path: 'default\_mpi\_type' and 'default\_mpi\_executable'

### User interface

- **Case 47529**

Added buttons in the LS-DYNA submission panel to view/edit these SHELL system files in the text editor: 'dyna\_versions', 'oasys\_queue' and 'oasys.submit'.

- **Case 46577**

SHELL now supports two new sense switches endtime and SWE for LS-DYNA V19.

### User defined

- **Case 47475**

SHELL is now saving the paths to the keyword files that have been recently submitted for the LS\_DYNA run via the SHELL. The list of these file paths is available in a drop-down menu attached to the 'Input File' widget in the 'LS-DYNA Submission' panel.

- **Case 47474**

SHELL is now saving a list of recent 'Command-line Expression' commands. These command-strings are available in a drop-down menu attached to the 'Command-line Preview' widget in the 'LS-DYNA Submission' panel.

- **Case 46263**

Added LS-DYNA command line preview and expression to SHELL submission panel. Also added edit widget to edit the command line using a text editor.

## 3.6 Oasys

### JavaScript API

- **Case 46441**

The console API (as specified in <https://console.spec.whatwg.org>) has been added to the JavaScript implementations in all our programs. This will allow `console.log()` etc. to be used in scripts.

- **Case 46401**

A bar showing garbage collection memory usage has been added to the JavaScript debugger.