

## Release notes for LS-DYNA version ls971.7600.398 and mpp971.7600.398.

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### *databases*

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Added option for MSC/DBALL database in \*DATABASE\_FORMAT

```
*DATABASE_FORMAT
$ iform      ibinary
  iform = 3   msc/dball output only
  iform = 4   msc/dball and d3plot output
```

Fixed the restart database when using sph.

Fixed output time in output database TRHIST

Fixed option to time average accelerations in nodout and d3thdt files for rigid body nodes (IACOOP=1 on \*CONTROL\_OUTPUT)

Increased to 9 the number of digits in part, section, material, eos, hourglass and thermal ID numbers.

Fixed d3thdt output with DCOMP=2 on \*DATABASE\_EXTENT\_BINARY.

Enabled 32 bit d3thdt and INFMAK files to be written on 64 bit systems.

Fixed d3thdt output with IALEMAT=1 option of \*DATABASE\_EXTENT\_BINARY for models with multi-material ale.

Fixed rwforc output to binout file.

Enabled dyna.str files generated with version 970 to be run with version 971.

Fixed full deck restart of problems using adaptivity.

Added option to print digitized curve data to d3hsp & d3msg using the following keyword format:

```
$=====
*CONTROL_OUTPUT
$ card 1
...
# card 2
$#1  #2  #3  #4  #5
                ipcurv
$=====
where ipcurve-flag for printing of digitized curve data to d3hsp & d3msg
  0-no print
  1-print
```

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### *material models*

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Fixed material type 30 (\*MAT\_SHAPE\_MEMORY) which has not worked since Nov. 2005.

Enabled discrete beam material 74 to be used for implicit analysis.

Fixed a round-off problem for single precision in discrete beam material type 74.

Fixed materials 82 and 99 for type 3 thick shell elements.

Fixed tangent stiffness matrix used in implicit solutions using material models 103, 104, and 106.

Fixed DYCOSS option of solid material 131 (\*MAT\_ISOTROPIC\_SMEARED\_CRACK).

Fixed restart dump file when material 157 or material 186 is used.

Fixed cohesive material 186 in SMP version to run with more than 1 processor.

Fixed stress initialization by \*INITIAL\_STRESS\_SHELL for some shell materials that have integer history data that must be set.

Fixed material 176. It now includes 3 formulations.

Fixed material 183 when used with shells and strain rate effects.

Fixed solid element material 187, (\*MAT\_SAMP-1)

Fixed EFG material 27.

Fixed EFG adaptivity for material 27.

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*elements*

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Added automatic checking of cohesive element orientation to prevent problems with incorrectly numbered elements.

Fixed SMP parallel consistency option for shell element type 17.

Enabled superelements to work for explicit solutions in single precision.

Fixed the shell element drilling d.o.f. force calculation for multiple processor SMP implicit

Fixed SMP parallel consistency option for shell element type 6.

Enabled implicit hyperelastic hourglass control (type 7) in solid elements.

Set number of failures till rupture to 1 if input as zero for beam failure type so that the welds do not fail immediately.

Made solid element spot weld resultants in swforc output consistent with version 970.

Fixed the bending stiffness and bending force in linear shell element type 18.

Fix automatic generation of solid spot welds from beam beam spot welds.

Restored beam behavior to that of version 970 when user-defined offsets are used. Offsets are defined either by nonzero SREF, TREF on \*BEAM\_INTEGRATION or the OFFEST keyword option on \*ELEMENT\_BEAM.

Fixed erosion of background elements with EFG shell type 41

Fixed 6-node EFG background element.

Fixed erosion of EFG 3D background elements.

Fixed EFG shell type 41 when the number of shell elements exceeds the number of nodes in the model.

Added support for erosion of meshfree shell type 42.

Fixed meshfree shell 42 when there are triangular elements with node numbering that is not consistent with the part.

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*contact*

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Fixed segment based contact to eliminate a discontinuity in the friction force when the normal force dropped to zero related to a switch for surface to edge-to-edge contact or vice versa.

Fixed full deck restarts with SMP segment based contact. Before, the fix, spikes in contact force were possible after the restart in an area that had large initial penetration before the restart.

Fixed possible memory error in segment based eroding contact.

Fixed SMP parallel consistency with segment based contact for the case when nnlq is less than nlq.

Added support for thermal contact birth/death time

Fixed the drawbead box as a tube feature.

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*ALE*

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Fixed \*AIRBAG\_ADVANCED\_ALE.

Increased the speed of automatically filling ALE materials by \*INITIAL\_VOLUME\_FRACTION\_GEOMETRY

Fixed ALE coupling with vents.

Enabled users to input AIR and GAS Part ID for \*AIRBAG\_ALE and \*AIRBAG\_ADVANCED\_ALE

Fixed restarting of ALE problems.

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*constraints*

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Added error checking for improper nodal constraints on r-adaptive nodes in solid elements.

Improved error reporting when problems arise with the use of \*CONSTRAINED\_LINEAR, \*CONSTRAINED\_INTERPOLATION, or \*CONTROL\_IMPLICIT\_INERTIA\_RELIEF in an implicit analysis.

Enabled the used of \*CONSTRAINED\_SPOTWELD massless spot welds with implicit analysis.

Enabled nodal rigid bodies to be connected by Joints.

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*other miscellaneous*

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Fixed rigid walls such that the death time is ignored during dynamic relaxation if the birth time is set to zero.

Fixed prescribed rigid body accelerations with the scale factor not equal to zero.

Added a function called Iqfint that converts external node or element identification numbers to internal. This function can be used in a user subroutine that has node or element specific behavior. Iqfint has 3 arguments. The first is the external id. The second is the data type, 1=node, 2=brick element, 3=beam element, 4=shell element, 5=thick shell element. The third is an error flag that returns a zero if the id is found and a 1 if not found.

Fixed \*BOUNDARY\_PRESCRIBED\_MOTION with birth and death times for DOF=-4.

Fixed load option \*LOAD\_SEGMENT\_SET\_NONUNIFORM.

Fixed a precision problem in the user defined load subroutine.

Added the keyword \*SET\_2D\_SEGMENT to define line segments for 2D analyses.

Added options \_3858 and \_5434a to \*DEFINE\_CURVE so that validated models can be run with the same curve discretization.

Fixed behavior of rigid walls when the solution changes between implicit and explicit.

Fixed non-zero birth times for implicit dynamic analysis, TDYBIR>0 on \*CONTROL\_IMPLICIT\_DYNAMICS

Improved treatment of rigid body spc's in local coordinates in implicit solutions.

Fixed spot welds such that the time step size does not become too small after a automatically switching from implicit to explicit analysis

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*MPP database*

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Corrected rigid body kinetic energy that is output to databases in MPP code.

Enabled rigid shell elements to be omitted from the d3plot files in MPP code.

Fixed MPP output of dynain file

Fixed MPP pre-decomposition when used with dynamic relaxation.

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*MPP element*

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Fixed MPP decomposition error that cause some solid element welds that use \*DEFINE\_CONNECTION data to not fail properly.

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*MPP contact*

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Fixed MPP segment based eroding contact. Before the fix, interior solid element segments (those not on the surface of a part) would be checked for contact if these segments were on the MPP decomposition boundary. These segments could prevent smooth sliding of one part along another but otherwise probably didn't cause too much trouble.

Modified MPP INTERFERENCE contact to not honor "IGNORE" flag until stiffness has been fully scaled up to 1.0. Before the change, if the ignore flag was on, the interfering nodes were generating no forces due to the penetration compensation.

Fixed possible memory errors in MPP contact when automatically switching between explicit and implicit analysis.

Fixed MPP pre-decomposition when \*CONTACT\_AUTOMATIC\_GENERAL contact is used with with beam elements.

Fixed MPP 2-surface contact force transducers.

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*MPP constraint*

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Improved joint stability in the MPP code.

Fixed \*CONSTRAINED\_JOINT\_STIFFNESS for MPP implicit analysis.

Enabled the use of joints for implicit analysis in the MPP code.

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*MPP miscellaneous*

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Fixed MPP error when using \*SET\_NODE\_GENERAL with multiple part ID's.

Improved MPP eigensolver performance statistics output.

Improved syncing of nodal displacements and rotations between processors to eliminate some general instabilities in MPP.

Fixed MPP pre-decomposition with \*CONTACT\_AUTOMATIC\_GENERAL.

Added new MPP decomposition option, aledist, to allow user to distribute internally generated ALE elements to all processors (MPP only)