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Marc® and Mentat® 2020

Release Guide

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Overview

1 Overview

Introduction

The Marc 2020 release contains new and enhanced solver and GUI capabilities for both specific work flows and general-purpose applications. In particular, this release includes enhancements to work flows involving induction heating and creep, while also delivering improvements to efficiency, performance, ease-of-use, robustness and accuracy across the majority of general-purpose work flows. Marc 2020 is the first Marc release supporting fatigue analyses for elastomeric materials.

- The Marc 2020 release also contains defect corrections associated with previous releases.
- Marc 2020 uses a different compiler version as Marc 2019 Feature Pack 1. See List of Build and Supported Platforms - Marc 2020 Release for more details.
- Marc 2020 requires the "Helium" release of MSC Licensing which uses FLEXlm 11.16.3.0. Please refer to the Marc and Mentat: Installation and Operations Guide for more details.

Overview of New Functionality

The new functionality in Marc 2020 includes:

- New and Expanded Work Flows
  - Significant improvement to creep simulations by enabling Material Data Fitting of creep data.
  - Expanded definition of E-M induction coils to include arbitrary shapes.
  - Improved convergence of thick walled coils.
  - Marc Co-Sim Adapter Compatibility with version 2020.
  - Fatigue analysis for elastomers.
- Smarter Solve
  - Interactive Analysis Statistics Report improves the model verification and debugging process.
  - Improvements to contact robustness and efficiency.
  - GPU Support for matrix operations to improve the performance of the iterative solver (Solver 2).
- Smarter Simulation Environment
  - Improvements to the process of creating and modifying Mentat Tables.
  - Ease of use improvements for model set up in Mentat by the introduction of the Model Dimension, which can be 3-D, axi-symmetric or planar. This allows for a consistent DOF identification in planar and 3-D models, and depending on the Model Dimension, display of only the relevant model options and parameters in various menus.
  - The default structural formulation has been changed to the nonlinear large strain formulation.
  - More intuitive default naming of copied entities.
  - Ease of use improvement for selecting plotted increment.
  - Improved performance of results monitoring during post processing.
  - Flexibility in defining quad sheet bodies and more accurate and easy to control rendering of solid bodies

More details can be found in the User's Guide in the chapter called **What's New**, along with examples to guide the user in applying the new functionality.

List of Known Defects in the 2020 Release

Marc

Contact

MARC-7984   When using node-to-segment contact in a coupled Thermal/Structural analysis, if a node contacts both a surface with glued contact and a surface with touching contact, then there is incorrect heat transfer on the touching face.

MARC-13581 A beam-to-beam contact analysis using the node-to-segment algorithm may fail if nodal transformations are used.

MARC-12637 Selecting the Near Contact Distance post code may significantly increase the stress recovery time.

Global Remeshing

MARC-7978   Hard nodes in the interior of the mesh are not available when using Global Adaptive Meshing in 2-D, hence if a boundary condition such as a Point Load, Fixed Displacement is applied to a point, then after remeshing, it will be applied to the node of the new mesh with the same ID as the node from the original mesh that is attached to the point, but this node may be in a different location.

Multi-Physics

MARC-12101 The options INITIAL STATE and POINT TEMP cannot be used in the same analysis, even if INITIAL STATE is not referring to the first state variable (temperate).

MARC-13682 Though thick-wire coils are only supported in magnetodynamic analyses, neither Marc nor Mentat issues any warning or error message if they are used in a magnetostic analysis.

Parallel Processing

MARC-12227 In rare cases, a Node-to-Segment DDM contact analysis using the RBE2 option may stop prematurely with exit number 1004.

MARC-8690   If a Marc model uses non-consecutive node and element numbering such that the ID's are much larger than the number of nodes and elements in the model, then the amount of memory required in a DDM analysis is significantly larger than in a serial analysis.

User Subroutines

MARC-10057 In a segment-to-segment contact analysis, the nodal post code Contact Stress is not supported by user subroutine NODVAR.F

Loads, Boundary and Initial Conditions

MARC-12897   The TYING CHANGE option may not work correctly with the RBE2 option.

MARC-12870   If elements are deactivaded during the former job, the Prestate option may fail with a misleading error message.

MARC-12643   In a restart analysis, if remeshing does not occur, the SURFACE SECTION option may not be correctly written into a Model Section file.

Other

MARC-11485   In rare cases, if the dynamic allocation of memory fails, Marc will stop prematurely without printing a clear error message.

MARC-12171   The nodal post code External Pressure is not correct for 10-node tetrahedral elements. This does not affect any other analysis results.

Mentat

General

MARC-11742   In very rare cases, the option to plot surfaces in the mode "Solid Display Without Lines" causes Mentat to crash.

MARC-8600   The database function set_entry(), that returns the id of a specific entry of a set, does not function for sets of type solid, solid_face, solid_edge and solid_vertex.

MARC-5408   The cross hairs option, which was available in Mentat Classic to provide guidance when picking items from the graphics window and which could be activated by clicking the SHIFT key on the graphics window, is not supported in the new Mentat.

MARC-5343   Faceted surfaces can not be duplicated, neither using the commands in the Geometry & Mesh → Duplicate menu, nor using the commands in the Geometry & Mesh → Symmetry menu.

MARC-14414   If multiple tables are present in a model, if you modify any of the existing table parameters followed by the Undo option, the first table in the list of tables will become the current table.

MARC-13491   In Contact Table Property menu, for some rare combinations of contact bodies, Make visible option may not work as expected and may continue to display all the contact bodies on the canvass.

Preprocessing

MARC-10183   In Mentat, the internal pressure on element type 31 (pipe element) cannot be defined.

MARC-6598   In 2-D models, Mentat allows one to apply initial conditions like Initial Temperature, Initial Velocity, etc. on surfaces. However, this is not supported by Marc. Such initial conditions must instead be applied to the nodes of the faces attached to the surfaces.

MARC-6492   No Planar Truss Geometric Property type is available in Mentat to define the properties of Marc element type 9 (a truss element which can be used both in 2-D and in 3-D analyses) if the element is used in a 2-D analysis.   As a workaround, a Geometric Property of type 3-D Truss can be created instead.

MARC-5352   Mentat does not support Geometric Properties for Electrostatic analyses to define for example, the thickness of a shell. The workaround is to temporarily change the Analysis class to Thermal, create a Thermal Geometric Property of the appropriate type for these elements and then change the Analysis Class back to Electrostatic.

MARC-4596   Mentat allows creating materials with identical names. This can be confusing when selecting a material.

MARC-4544   Mentat does not support the Marc option to choose magnitude/phase or real/imaginary nodal output in harmonics for the PRINT NODE option.

MARC-3587   Multiple axes of rotation for Centrifugal loads are not supported within Mentat.

MARC-3511   The General Traction distributed load type 21 is not supported within Mentat.

MARC-2136   Mentat does not support the Foundation option for 2-node line elements.

MARC-1622   Mentat is unable to control the prescribed displacement boundary conditions in a Modal Dynamics Load case. This may results in problems with Design Optimization in a modal dynamics simulation.

MARC-13717 If a meshed solid is scaled, then boundary conditions applied to the solid are lost.

MARC-13465 Mentat records the dynamic viewing command with the view number, but doesn't record the graphics window (such as Model, Table, Path Plot,etc.). So, in some cases the wrong graphics window may be used when executing the procedure file.

Postprocessing

MARC-10509 If sample point data is tracked using the post file of a pure thermal analysis involving remeshing, then the option Fixed Points In Space must be set. If this is not done, no warning message is given and an incorrect sample point plot may be created.

MARC-10225 Data collection for History Plotting does not function correctly if sub-incremental data has to be collected.

MARC-10126 Model clipping by results scalar does not work when the nodal averaging of the results is turned off. Only exterior faces of the visible elements are shown and internal elements do not show up at all.

MARC-8764   If a report is created using the Report Writer for selected entities (nodes and/or elements) and over a list of increments while post-processing a job with adaptive meshing, then no data will be reported for the selected entities, unless they have been selected in the finite element mesh of the first increment in the list. In that case, data will also be reported for subsequent increments in the list until the finite element mesh changes. A workaround is to create a report of the current increment for the selected entities, or for all entities over the increment list.

MARC-8114   If the entities (surfaces, curves and points) of a trimmed geometric contact body are made invisible through the command sequence Select Contact Body Entities / Make Invisible, then the trimming curves show up again when skipping to an increment with a different mesh (due to remeshing). Workaround is to make the contact body itself invisible, e.g. through the Model Navigator.

MARC-5906   If Cutting Planes are defined in postprocessing and the extreme values of the quantity are assumed on the cutting plane and not on the surface of the model, then these extreme values are not reflected in the legend.

MARC-5748   When postprocessing jobs in which VCCT cracks are initiated during the analysis (i.e. not all cracks already exist at the start of the analysis), then history plots involving crack related quantities, such as Energy Release Rate, Accumulated Crack Growth and the Number of Fatigue Cycles, may be incorrect if the data is collected in a range of increments in which a new crack has been initiated. The workaround is to collect data from the increment in which the crack has been initiated to the last increment before the next crack is initiated.

MARC-5015   The automatically computed range of the current scalar or vector quantity, as shown in the Scalar Plot Settings and Vector Plot Settings menus, respectively, is not updated automatically if one skips to a different increment. The legend on the graphics window shows the correct range though. The menus can be updated by pressing the Enter key once in the "Command" box of the Dialog, i.e. by entering an empty command string.

MARC-4622   In rare cases, a non-symmetric contour plot is shown for a symmetric problem.

MARC-1226   The automatically computed value range for a vector plot of 3-D continuum elements may be wrong when only the Edges on the Surface are being drawn.

Marc Writer

MARC-9714   If a Marc input file is created for a segment-to-segment contact analysis with a non-zero interference closure, but without augmentation, Mentat will not issue an error message, although the Marc analysis will stop with exit number 13.

MARC-8105   If old-style input is used, an incorrect input file may be written for a job that contains a harmonic load case with a distributed load. Workaround is to use new-style (table-driven) input.

MARC-7996   If a model has multiple radiation cavities, each cavity should have its own boundary condition, instead of assigning the same boundary condition to multiple cavities. However, Mentat will not issue a warning or an error message in such cases.

MARC-7215   User defined point, curve and surface sets consisting of points, curves and surfaces of a geometric contact body, or of points, curves and surfaces which are not used in the finite element analysis (i.e. do not have mesh attached, are not used to define the material coordinate system of an Orientation, etc) can be written to the Marc input file as empty sets and thus will show up in postprocessing also as empty sets for DDM analyses using decomposition in Mentat.

MARC-5929   If a WELD FLUX boundary condition is not explicitly selected in a load case of a restart analysis, Mentat does not write WELD PATH and WELD FLUX data into the Marc input file, causing Marc to stop prematurely with exit number 77.

MARC-4047   Mentat does not write a correct Marc input file if two node, element, edge, face, point, curve, or surface sets exist with the same name.

MARC-13681   When defining a centrifugal load in a model that consist only of axisymmetric model sections (without any element in the model), the definition of the axis of rotation is not written to the *.dat file.

MARC-12459   Standard beam sections such as Rectangular, Circular, Elliptical, Square, Triangular, etc. are not written into a Model Section file (as opposed to customised beam sections using Area, Ixx and Iyy).

Marc Reader

MARC-9765   The OP2 option is not supported.

CAD

MARC-8660   On rare occasions, defeaturing may not work correctly for certain features, like chamfers, fillets, etc.

MARC-8002   The Holes and Pockets options in the Import → General CAD As Solids → Defeature Settings menu, that allow one to select the types of holes that are to be removed when importing a CAD model, do not work. If the Remove Holes/Pockets option is switched on, then all holes and pockets with a radius within the given range are removed from the model.

MARC-5655   For some CAD models, the automatic feature removal options in the File → Import → General CAD As Solid menu may fail. Workaround is to remove the features after import via the Defeature menu on the Geometry & Mesh tab of the main menu.

MARC-14461   For intricate geometries, switching off the Auto Calculate Tolerance option in the Solid Plot Setting menu may cause the geometry to be displayed incorrectly.

Other

MARC-9925   The Marc Movie program fails to import multiple RGB files at once.

MARC-7266   When using remote access (for example, VNC) to use Mentat on a Linux machine, creation of GIF movies may fail; the image may appear mirrored.

List of Fixed Defects in the 2020 Release

Marc

Multi-Physics

MARC-14951   The results of a curing analysis using one or more of the element types 127, 130, 136, 155, 156, 157, 184, 239, 240 and 241 were incorrect.

MARC-14542   In a magnetodynamic pass a table could not be used for a coil current boundary condition when this boundary condition is applied to a thick wire coil.

MARC-14492   If in a coupled magnetostatic/structural analysis Lorentz forces are computed, It could happen that a coil current boundary condition was deactivated after remeshing.

MARC-14435   Table input style was not complete supported for piezoelectric materials: the relative permittivity and the inverse relative/absolute permittivity were not supported; moreover, the electrical permittivity could not depend on a table.

MARC-14394   The evaluation of tables involved in the film molar flow rate (such as for the sink concentration or the transfer film coefficient) has been improved for cases where the molar concentration is used as an independent variable (by taking into account the estimated value of the molar concentration).

MARC-14368   The Load Case Solution Control options Non-Positive Definite and Assembly Each Iteration were not taken into account for Multi-Physics style input, except if a structural analysis is performed.

MARC-14347   The computation of the total current density in axi-symmetric thick wire coils was less accurate at higher frequencies.

MARC-13909   The computed reaction charges were incorrect for harmonic magnetodynamic analyses.

MARC-13654   In a coupled analysis including a thermal pass, if a film load is defined for the other pass (e.g. MOL FILM for molecular diffusion) by a table depending on the temperature, then the temperature used for the table evaluation was incorrect.

MARC-13645   When in a magnetodynamic analysis a distributed current is applied using user subroutine FORCEM, the post quantities "Real (or Imaginary) Applied Current Density" and "Real (or Imaginary) Current Density" were incorrect.

MARC-13607   When in a harmonic magnetodynamic analysis pass thick wire coils are used and the coils are partly modeled using anti-symmetry or cyclic symmetry, in some cases the length of the coil could be computed incorrectly. This would result in a wrong applied current.

MARC-13572   When in a coupled magnetostatic/structural analysis a permanent magnet is defined using orthotropic material properties with a shifted B(H) relation, the computed Lorentz force was incorrect when the virtual work finite difference method is used.

MARC-13969   If subroutine FLUX is used for molecular diffusion (flagged on the DIST MOL model definition option), the concentration passed as an input quantity to FLUX was zero.

MARC-13969   If subroutine FLUX is used for molecular diffusion (flagged on the DIST MOL model definition option), the concentration passed as an input quantity to FLUX was zero.

Contact

MARC-13966   Augmentation for Segment-to-Segment contact could not be deactivated in a restart analysis.

MARC-13908   Penalty factor print-out in the output file only reflected changes made to the scale factor in the global CONTACT CONTROL menu (CONTACT card) and did not reflect changes made to the scale factor in the CONTACT INTERACTION menu (CON INTERA card). Note that the analysis itself used the updated penalty factor and the problem was only with the print-out.

MARC-13896   Load controlled meshed rigid bodies with transformations on the control node could produce incorrect results.

MARC-13880   In a domain decomposition analysis, the values of the film heat flux and the film molar flow rate on the post file could be incorrect. This did not affect any of the other analysis results.

MARC-13790   If a node touches multiple segments of the same contact body, the Near Contact Distance (nodal post code 65) was reported as a negative number.

MARC-13711   For segment-to-segment contact, shells that were continuous but in two separate contact bodies, could be erroneously detected as being in contact along the common edge. Such common edges are now skipped in the contact check.

MARC-13707   In rare cases, if in a transient dynamic analysis with adaptive time stepping a load-controlled rigid body is not sufficiently constrained by contact or boundary conditions and it undergoes very large displacements, the time step could be reduced to a very small number, finally leading to a program crash. Protection against the crash has been added, and a warning message is printed if such large displacements are detected.

MARC-13631   In rare cases, if a Geometric Contact Body consists of segments having a small area (order of magnitude 1e-12), then contact with this body could be missed completely (this happened both for the node-to-segment and the segment-to-segment algorithm).

MARC-13558   External heat fluxes reported in the output and on the post file were wrong in a segment-to-segment contact analysis without friction. All other results were correct.

MARC-13455   In 3-D remeshing analysis with the remeshed body in contact with shells where the thickness is not taken into account and only top or bottom surface is used, then in certain cases nodes could incorrectly be moved to the contacted shell body during re-meshing.

Restart

MARC-14805   When in a global-local analysis in the global analysis a restart is performed and the data from the original post file is not copied to the new post file, Marc could end prematurely.

MARC-13895   When a restart of a job is done, where in the original job the model definition option NAMES is used, but not in the restarted job, Marc could end prematurely. This could particularly happen if a long name is used for a load case in the original job, but a regular name for a loadcase in the restarted job.

MARC-13612   The scale factors for normal and tangential penalties for segment-to-segment contact could not be changed in a restart run.

Other

MARC-14802 When the option to print element volume, mass, and energy is chosen, the mass was not printed correctly when the post quantity "principal values of total strain tensor" is requested.

MARC-14259 "Stress and Strain output on the post file and access via ELMVAR had a number of inconsistencies for layered elements:

(a) Generalized Stresses for layered beams (solid section beams / beams identified through thin-walled sections) were incorrect. Now, the generalized stress tensor (post code 311 without a layer number which refers to beam forces and moments) is available as described in Volume B for each beam element.

(b) Cauchy stress (and many other stress and strain quantities) are not available in generalized form - by default, they are available at layer 1 for layered elements (shells, composite solids, solid shell, layered beams). The terminology on the post file now refers to the Cauchy stress (and such quantities) as ""Cauchy Stress at Layer 1"" so that it is very clear that the ""Cauchy stress"" is a true stress quantity as opposed to the generalized stress (which is a force / moment quantity for layered shells and beams).

(c) Harmonic stresses were only available at layers with the default layer always being 1. Now, generalized harmonic real and imaginary stresses for shells and layered beams are available when no layer number is specified.

(d) Harmonic strains were available in generalized form (membrane strains and curvature strains) and in layer form - however, on the post file, these quantities were inter-changed. i.e., when no layer number was specified, the layer 1 strains were output. When a layer number was specified, the generalized strains were output. This is now corrected for harmonic real and imaginary strain tensors and equivalent harmonic real and imaginary strains."

MARC-13573 In a model with radiation, the calculated values of the Film Heat Flux and Reaction Heat Flux were wrong for nodes with radiation to the environment. All other results were correct.

MARC-13536 When elements are deactivated in a load case via the DEACTIVATE option, the Glue Deactivation Status and the Contact Status were lost.

Local Adaptivity

MARC-14432 A thermo-mechanical welding analysis could end prematurely with exit number 61 when the activated weld filler is subdivided due to local adaptive meshing.

MARC-13795 In some cases, a segment-to-segment contact analysis with local adaptivity and solid shell elements (type 185), could yield NaN's in the contact stress output.

Global Remeshing

MARC-14419 In 3-D tetrahedral remeshing with designated regions and Herrmann type elements, the displacements at the interface between the part of the contact body being remeshed and the part which is not, were incorrectly zeroed out. For large deformations, this would lead to incorrect results or the analysis could even fail to run to completion.

MARC-13824 With crack initiation using remeshing, distributed loads that are present where the crack is added should be extended into the new crack faces. However, this was not done correctly when the loads are applied to solid faces and there are multiple solid faces on which the load is applied. Also, other loads than distributed loads applied on solid faces were incorrectly extended into the new crack faces.

MARC-13780 In rare cases (typically with very small models with a relatively large number of boundary conditions), an analysis involving global remeshing could stop prematurely, after having printed the message "*** warning - memory overwrite detected by marc_memsize!".

MARC-13651 Remeshing combined with element deactivation could in some cases lead to a premature ending of the analysis.

MARC-13557 Symmetry and cyclic symmetry contact will no longer be considered in 3-D tetrahedral remeshing with mesh density control based upon contact status.

MARC-13474 3D remeshing could fail if the model dimensions are such that the element sizes are very small, like edge lengths of 1e-6 or smaller. The new mesh after remeshing could become quite irregular in this case.

MARC-13442 An analysis involving element type 28 (quadratic quadrilateral axi-symmetric element) would stop prematurely with exit number 13. The workaround was to use the FEATURE,21001 parameter option.

When using the relax mesher for planar or axi-symmetric quadratic elements, the option to relax nodes in contact could cause the analysis to stop prematurely with exit number 1005.

User Subroutines

MARC-14388 When user subroutine plotv is called in a multiphysics analysis the vector "t", which contains the state variables, could contain wrong values. In a coupled Magnetodynamic/Thermal analysis, the vector "s" is not defined, but could contain illegal values.

MARC-14205 The utility subroutine UT_TRANSFORMTENSOR would produce wrong results for the case of non-composite shells.

MARC-14075 User subroutine UCOHESIVE did not have a separate array to define the change in stress due to the change in temperature dependent properties (which might improve the convergence behavior).

MARC-13912 The strains passed into user subroutines UFAIL and MD_UFAIL were not correct if varying thermal strains are present in the model. Now the thermal and plastic strains are passed also into these user subroutines.

Parallel Processing

MARC-14312   The command line option "-gpu auto" and the utility program "deviceinfo" have been updated to recognize all applicable GPU cards.

MARC-14195   Number of CAD faces for a single solid in a solid:face set were limited to 99 in a parallel run using domain decomposition. The allowed number is increased to 9999 now.

MARC-13941   The single post file of a DDM analysis using the CROSS-SECTION option with the simple method input mode, was corrupt and could not be opened by Mentat.

MARC-13579   In rare cases, a single input file DDM analysis with post file revision 11 would stop prematurely.

MARC-13266   In rare cases, a DDM analysis using local adaptivity could stop prematurely.

Loads, Boundary and Initial Conditions

MARC-14206   The option to exclude a film load if an element edge (2-D) or face (3-D) is fully in contact (by entering a 1 in the 6th field of the 3rd data block of the FILMS option for table-driven input) did not work. The workaround was to enter a -1 instead of a 1 in the above mentioned input field.

MARC-13753   Reading temperatures from a post file in a creep analysis using fixed time stepping with the CREEP INCREMENT history definition option repeatedly read increment 1, but not the subsequent increments. Now each CREEP INCREMENT reads a new increment from the post file.

MARC-13670   When performing a Job Check, a warning message is generated now for cavities defined by surfaces only, i.e. without elements attached to the surfaces.

MARC-13652   Initial conditions applied using the PRE STATE option did not work correctly for the exponential cap powder material model.

MARC-13527   If the post file used by the PRE STATE option is based on a model with non-consecutive node numbering, Marc issued a warning message in the output file, but nevertheless continued and performed an incorrect mapping of the nodal temperature.

Materials

MARC-14050   When phase transformation is modeled using a time-temperature transformation curve (TTT), unexpected phase transformations could occur when the temperature is held exactly constant.

MARC-13860   In a RP-FLOW analysis, the initial strain rate (defined on the PARAMETERS option) was not correctly applied if a structure is loaded for the first time after increment 1 (e.g. if increment 1 is used as an APPROACH load case). In such cases, instead of the initial strain rate, the cut-off value of the strain rate was used as a first estimate of the strain rate.

MARC-13854   Defining anisotropic plasticity via user subroutine UANISYLD did not produce correct results.

MARC-13772   If element type 247 is used in an analysis with a Rigid Plastic material model, then in come cases the analysis would converge slowly or not at all.

MARC-13671   The Gurson damage model could produce NaN's if the hardening modulus of the material is equal to zero.

MARC-13489   The reported value of the Yield Stress at Room Temperature for the Chaboche plasticity model was wrong. Note that this value is used only for post processing; it does not affect the result of the analysis.

MARC-13326   Applying the Buyukozturk yield criterion to plane stress elements could cause the analysis to abort prematurely.

MARC-7611   A new shift function has been added which combines the Williams-Landel-Ferry function and the Arrhenius function. A capability has been added to define the shift factors directly with the help of a table.

Fracture Mechanics

MARC-13856   The output for the J-integral results was incorrect for the case that a crack is created with crack initiation and there are multiple cracks. This applies both to the results written to the output file and to the post file. If the J-integral is used for crack propagation, then the correct values would be used.

Mentat

General

MARC-14926 Mentat could terminate prematurely if the element labels are displayed for elements attached to solid, sheet or wire bodies with very long names (more than approximately 75 characters) and the attach information (i.e. the name of the body to which the element is attached) is included in the element label.

MARC-14676 For bushing elements with the local X-direction defined by the beam axis and for 2-D beam elements, the colors of the arrows used to indicate the local Y- and Z-directions of these elements were not correct. This was primarily visible in the dark theme, where red, green and blue arrows are used to indicate the local X-, Y- and Z-directions, respectively. For bushing elements and 2-D elements, however, the Y-direction was indicated by a red arrow and Z-direction by a green arrow. The problem was not immediately visible in the light theme, since the arrows are by default displayed in black, but could show up in that theme as well if one would change colors of these arrows (by changing the Triad X, Triad Y and Triad Z colors in the View>Graphics Colors menu). Note that, even though the colors were wrong, the arrows were correctly labelled "Y" and "Z", respectively.

MARC-14670 If the option Identify Sets is active and in the model navigator a set is disabled (usually by switching off the check-box or via the RMB -> Hide option), then an incorrect color box was shown for this set. Changing the color of that box would change the background color of the graphics area.

MARC-14482 When using the dark theme, some icons in the model browser were almost invisible. In Marc Mentat 2020, icons have been improved for Tables, Transformations, RBE2's, RBE3's, Cavities, Chains, Nodal Ties, Servo Links, Welds, and Coils.

MARC-14355 The performance of the Model Navigator has been improved for folders containing a huge number of items.

MARC-14055 The performance of writing the backup file for the UNDO/REDO operations has been improved.

MARC-14054 Nodes associated with a Weld Path were considered as free nodes and got removed upon using the command to delete all nodes.

MARC-13792 If the Show Node command is used for a node which has a transformation and which is attached to a point, Mentat could crash.

MARC-13684 Starting Mentat in a directory that contains many files or sub-directories (several thousands) could take a long time, in particular if the directory is located on a disk that is mounted from another machine (i.e. a network drive on Window or an nfs-mounted disk on Linux).

MARC-13635 If the mouse wheel is used to zoom in on the location under the mouse pointer and the Mouse Zoom Method in the View>View Control menu is changed from the default Zoom Camera method to Scale Model, then subsequent use of the mouse wheel to zoom in even further did not zoom in to the correct location. Note that if either the Zoom Camera method or the Scale Model method was used for the entire zoom operation, then the problem did not occur. Notice also that the Mouse Zoom Method in the View>View Control menu has been renamed to Mouse Wheel/Right Mouse Button (if the Traditional mouse scheme is used) or to just Mouse Wheel (if the Auto-Dynamic mouse scheme is used).

MARC-13594 Hiding a contact body defined by a solid with faceted surfaces did not work correctly.

MARC-13571 The Face Flood selection method did not work correctly for collapsed elements.

MARC-13496   The Zoom Box option was not working when Dynamic Mouse Control is switched on.

MARC-12886   Creating an stl file in binary file format did not work (instead of a binary file, an ascii file was created). Now the extension .stlb is used for binary files (the extensions .stla and .asc are used for ascii files).

Marc Reader

MARC-14825   The flag to exclude films on element edges (2-D) or faces (3-D) which are fully in contact (6th field of the 3rd data block of the FILMS option for table-driven input) was not imported. As a result, films were always active, irrespective of the contact conditions.

MARC-14586   The option to exclude fully damaged elements from the post file was not imported for the Gurson damage model.

MARC-14083   Upon importing a Meshed Rigid Contact Body with Control Type Position or Velocity, its Control Type was set to Load.

MARC-13609   The algorithm to automatically create names of boundary conditions has been improved in order to speed up the import of data files with a large number of boundary conditions.

Nastran Reader

MARC-13853   The section names in BDF files exported by Apex were not imported by Mentat and used as Geometric Property names.

Menu System

MARC-14807   Mentat could terminate prematurely while recompiling the binary menu file (main.msb), if it has been configured such that the dark theme is automatically enabled at startup (via the Save button in the Theme > Settings box in the Mode > Settings menu). The created binary menu file was empty and invalid in that case.

MARC-13874   If a new directory is created via the file browser in Mentat, the name of this new directory was only partly visible if the dark theme is used.

MARC-13599   The Beam Section button in the Geometric Properties menu for beam elements did not work correctly.

MARC-13506   In the CONVERT menu, it was suggested that a surface could be converted to a solid face, instead of a sheet body, and a curve to a solid edge, instead of a wire body.

Other

MARC-14487   When the first element in a model is collapsed quad element, exporting the model to a bdf file failed.

MARC-14217   An empty line embedded within a node or element card in I-deas universal file would cause an incomplete translation of that entry.

MARC-13837   Several API's have been added to the Python interface, allowing the user to access data of the following entities: RBE2, RBE3, RROD, BOLTS, Boundary Conditions and Initial Conditions. Please refer to the Python Manual for more information.

MARC-13721 Plane strain, plane stress and axisymmetric Geometric Properties were exported as PSHELL, instead of PLPLANE and PSHLN2.

MARC-13716 The axisymmetric element type 89 was exported as CBEND and PSHELL, instead of CAXISYM and PAXISYM.

MARC-13655 The truss element type 9 was exported as the CBAR Nastran element, instead of the CROD element.

MARC-13575 If a model with default job parameters is saved in an older style than the default (2019.1), then Mentat would crash. The workaround was to manually set at least one job parameter.

MARC-13518 On Windows, any of the command line options containing a directory name (i.e. -bp, -hp, -ml, -mp, -path and -pl), did not function correctly if the directory name contains one or more spaces.

Pre Processing

MARC-14467 Switching off the Linear Elastic Analysis option could cause some other job options to be changed, more precisely the option Nonlinear Procedure:Small Strain/Large Strain in the Analysis Options menu, and the options Large Rotation, Large Strain:Automatic/Updated Lagrange/Total Lagrange and Plasticity Procedure:Additive Decomposition/Multiplicative Decomposition in the Advanced Analysis Options menu.

MARC-10989 If a boundary condition or initial condition is applied to a surface and the surface has one or more trimming curve loops, such that part of the surface is trimmed off (for example, a plate with a hole), and if the boundary condition or initial condition is displayed on the surface (i.e. the Draw On Mesh options in Boundary Conditions ->Plot Settings and Initial Conditions -> Plot Settings are not switched on; this is the default) then the arrows of the boundary condition or initial condition could be drawn outside the surface definition (i.e. outside the region enclosed by the trimming curve loop(s)). This was purely a rendering issue and did not affect the mesh entities to which the boundary condition or initial condition is applied in the analysis. The latter can be checked by switching on the Draw On Mesh options.

List of Build and Supported Platforms - Marc 2020 Release

Marc Platforms

Type	OS	Hardware	Fortran Version	Default MPI
Linux (64 bit)	Red Hat RHEL 7.3/7.5 SUSE 12SP1/SP2	Intel EM64T or AMD Opteron Intel EM64T or AMD Opteron	Intel XE 19.04[1] Intel XE 19.04[1]	Intel MPI 2019 Update 4 Intel MPI 2019 Update 4
Windows (64-bit)	Windows 10 Windows Server 2016	Intel EM64T or AMD Opteron	Intel XE 19.04[1]	Intel MPI 2019 Update 4[2]

[1] When using user subroutines, Intel Fortran XE 19.04 must be installed. When using user subroutines on Windows, Microsoft Visual Studio 2017 must also be installed.

[2] Supports also Microsoft MPI program version 9.0.

Mentat Platforms

Vendor	OS	Hardware
Linux (64-bit)	Red Hat RHEL 7.3/7.5 SUSE 12SP1/SP2	Intel EM64T or AMD Opteron
Windows (64-bit)	Windows 10 Windows Server 2016	Intel EM64T or AMD Opteron
All platforms support Python 3.6.		

Mentat Graphics Card Support

The following graphics boards have been certified to work with the Mentat 2019 release:

Graphics Board	Graphics Driver Version
AMD FirePro V4800(FireGL V)	15.201.2401.0
AMD FirePro W4190M	21.19.142.32768
AMD Radeon Pro WX 4130	21.19.384.3
AMD Radeon Pro WX 4130	21.19.384.3
AMD Radeon Pro WX 4150	21.19.384.3
AMD Radeon Pro WX 7100	21.19.384.3
AMD Radeon Pro WX4150	16.40.3801.1002
AMD Radeon WX2100	22.19.640.2
AMD Radeon WX2100	22.19.640.2
AMD Radeon WX3100	22.19.640.2
AMD Radeon WX3100	22.19.640.2

Graphics Board	Graphics Driver Version
AMD Radeon Pro WX 3100	23.20.787.768
AMD Radeon Pro WX 3200	19.Q2
AMD Radeon WX4100	17.10.1730.1004
AMD Radeon WX4100	22.19.640.2
AMD Radeon WX4100	22.19.640.2
AMD Radeon WX5100	17.10.1730.1004
AMD Radeon WX7100	17.10.1730.1004
AMD Radeon WX9100	22.19.640.2
AMD Radeon WX9100	22.19.693.256
AMD Radon Pro WX3100	26.20.13028.13
AMD Radon Pro WX3200	26.20.13028.13
AMD Radon Pro WX4100	26.20.13028.13
AMD Radon Pro WX5100	26.20.13028.13
AMD Radon Pro WX7100	26.20.13028.13
AMD Radon Pro WX8200	26.20.13028.13
AMD Radon Pro WX9100	26.20.13028.13
Nvidia Quadro M1200	21.21.13.7586
Nvidia Quadro M1200	377.43
Nvidia Quadro M1200	377.43
Nvidia Quadro M2200	21.21.13.7586
Nvidia Quadro M2200	377.43
Nvidia Quadro P1000	377.11
Nvidia Quadro P2000	377.11
Nvidia Quadro P2000	23.21.13.8908
Nvidia Quadro P3000	21.21.13.7586
Nvidia Quadro P3200	23.21.13.8908
Nvidia Quadro P4000	21.21.13.7586
Nvidia Quadro P4000	377.11
Nvidia Quadro P4000	385.69
Nvidia Quadro P5000	21.21.13.7586
Nvidia Quadro P5000	377.43
Nvidia Quadro P5000	377.11
Nvidia Quadro P600	377.11

Graphics Board	Graphics Driver Version
Nvidia Quadro P600	23.21.13.8908
Nvidia Quadro P6000	377.11
Nvidia Quadro P620	23.21.13.9077
Nvidia Quadro RTX 5000	25.21.14.1917
Nvidia Quadro RTX 6000	25.21.14.1917
Nvidia Quadro RTX 4000	25.21.14.1917
Nvidia Quadro P2200	26.21.14.3064
Nvidia Quadro T1000	25.21.14.2591
Nvidia Quadro RTX3000	25.21.14.2591
Nvidia Quadro RTX5000	25.21.14.2591

Peripheral Devices

3DCONNEXION's SpacePilot PRO, SpaceMouse PRO and SpaceNavigator products, have been tested with Mentat. For Linux based systems, see the Marc and Mentat: Installation and Operations Guide for additional information.

Security Notes

The 2020 Beta release requires the FlexLM 11.16 (Helium) server version and stores the license manager (lmgrd) by default in the directory `C:\Program Files\MSC.Software\MSC Licensing\Helium\lmgrd` for Microsoft Windows and for Linux platforms it is `/msc/MSC.Software/MSC Licensing/Helium/lmgrd`. The default location for the license file is `MSC Licensing/Helium`.

The capabilities that require a license are given below with feature names as required in the license file.

1.	MARC	license required to run one single processor job or one instance of a multiple processor (parallel) job.
2.	MARC_Parallel	license required per processor in a parallel run (either DDM, or parallel element assembly and stress recovery, or parallel CASI).
3.	MARC_Mesh2D	license required for each run requiring automatic 2-D remeshing feature in Marc.
4.	MARC_Mesh3D	license required for each run requiring automatic 3-D remeshing feature in Marc.
5.	MARC_ShapeMemory	license required for each run using shape memory model.
6.	MARC_MetalCutting	license required for each run modeling metal cutting operation.
7.	MARC_Electrical	license required for Joule-Mechanical, Coupled Electrostatic- Structural, and Piezoelectricity.
8.	MARC_GPU	license required to use the GPGPU solver capability.
9.	MARC_CASI	license required to use the CASI iterative solver.
10.	MARC_Hexmesh	license required for each instance of Hexahedral mesher.
11.	MARC_MatFit	license required for advanced material data fitting.
12.	MARC_PhaseTrans	license required for MICROSTRUCTURE phase transformation model.
13.	MARC_CoSim_Adaptor	license required to run a co-simulation analysis with MSC CoSim.
14.	Mentat	license required for each instance of Mentat.
15.	Mentat_Parasolid_CAD	license required for each instance of Parasolid when working (import/export/meshing) with Parasolid based models. This license does NOT allow the creation of solid geometry or the modification of solid geometry through Booloean operations, blending, and/or feature recognition and removal.
16.	Mentat_Parasolid_Modeling	license required for each instance of Parasolid when working (import/export/creation/modification/ meshing) with Parasolid based models.
17.	Mentat_ITI_Access	license required for each instance of, or exporting a file using the DXF, IGES, or VDAFS translators.
18.	Mentat_CMOLD	license required for each instance of CMOLD when working (import/export) with CMOLD based models.

19.	Mentat_Geometry_Translators	license required for import of Parasolid, IGES, IDEAS, ACIS, STEP, STL to Parasolid Geometry with cleanup of model.
20.	Mentat_CATIAV4_Access	license required for import of CATIAV4 model to Parasolid Geometry with cleanup of model.
21.	Mentat_CATIAV5_Access	license required for import of CATIAV5 model to Parasolid Geometry with cleanup of model.
22.	Mentat_Creo_Access	license required for import of Creo and Pro/E model to Parasolid Geometry with cleanup of model.
23.	Mentat_Inventor_Access	license required for import of Inventor model to Parasolid Geometry with cleanup of model.
24.	Mentat_JT_Access	license required for import of JT model to Parasolid Geometry with cleanup of model.
25.	Mentat_NX_Access	license required for import of NX model to Parasolid Geometry with cleanup of model.
26.	Mentat_SolidWorks_Access	license required for import of SolidWorks model to Parasolid Geometry with cleanup of model.