Marc® and Mentat® 2021.2

Release Guide

HEXAGON | MSC Software

Corporate
MSC Software Corporation
5161 California Ave., Suite 200
University Research Park
Irvine, CA 92617
Telephone: (714) 540-8900
Email: americas.contact@mscsoftware.com

Europe, Middle East, Africa
MSC Software GmbH
Am Moosfeld 13
81829 Munich, Germany
Telephone: (49) 89 431 98 70
Email: europe@mscsoftware.com

Japan
MSC Software Japan Ltd.
KANDA SQUARE 16F
2-2-1 Kanda Nishikicho
Chiyoda-ku
Tokyo 101-0054, JAPAN
Telephone: (81) (3)-6275-0870
Email: MSCJ.Market@mscsoftware.com

Asia-Pacific
MSC Software (S) Pte. Ltd.
100 Beach Road
#16-05 Shaw Tower
Singapore 189702
Telephone: 65-6272-0082
Email: APAC.Contact@mscsoftware.com

Worldwide Web
www.mscsoftware.com

Support
http://www.mscsoftware.com/Contents/Services/Technical-Support/Contact-Technical-Support.aspx

Disclaimer

MA:V2021.2:Z:Z:Z:DC-REL-PDF

Documentation Feedback

At MSC Software, we strive to produce the highest quality documentation and welcome your feedback. If you have comments or suggestions about our documentation, write to us at: documentation-feedback@mscsoftware.com.

Please include the following information with your feedback:

- Document name
- Release/Version number
- Chapter/Section name
- Topic title (for Online Help)
- Brief description of the content (for example, incomplete/incorrect information, grammatical errors, information that requires clarification or more details and so on).
- Your suggestions for correcting/improving documentation

You may also provide your feedback about MSC Software documentation by taking a short 5-minute survey at: http://msc-documentation.questionpro.com.

Note:	The above mentioned e-mail address is only for providing documentation specific feedback. If you have any technical problems, issues, or queries, please contact Technical Support.

C O N T E N T S

Marc and Mentat Release Guide

Table of Contents

1
Overview

1 Overview

Introduction

Among other things, the Marc 2021.2 release introduces new analysis options, solver performance improvements, contact and GUI enhancements.

A new key feature of Marc 2021.2 is the possibility to perform classical stress-life and strain-life fatigue calculations in the time domain. These are often used for the study of fatigue in metals but can also be used for other types of materials such as plastics.

For planar and axisymmetric models, the node-to-segment contact algorithm has been enhanced by introducing the hybrid contact algorithm, which improves the constraint algorithm for contact between meshed bodies and can for example be applied to simulate complex rubber seal contact.

The MUMPS solver, with further improvements compared to Marc 2021.1, is now the default solver when preparing a Marc analysis in Mentat. SMA materials can be applied to beam elements, structural solution quantities can be selected as independent table variables and gaps in ATAS support by Model Sections have been closed. Various ease-of-use and GUI completeness issues have been addressed and several defects associated with previous releases have been corrected.

Marc 2021.2 uses the same compiler version as Marc 2021.1. See List of Build and Supported Platforms - Marc 2021.2 Release for more details. Marc 2021.2 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 2021.2 includes:

Marc

- Fatigue Enhancements:
  - Parts of the CAEfatigue time domain capabilities are integrated in Marc now and the user can directly use Mentat to prepare and launch advanced Fatigue analyses.
- Hybrid Contact for Planar and Axisymmetric Models:
  - For planar and axisymmetric models, an extension of the node-to-segment (NTS) method is introduced which is called the Hybrid Contact algorithm. This algorithm is aimed to improve complex contact scenarios between meshed (deformable) bodies without the need for getting extra input from the user.
- MUMPS Solver Improvements:
  - The limitations of the renumbering logic introduced in Marc 2021.1 have been removed. The singularity ratio is now printed by default and available during Job Monitoring in Mentat. The MUMPS solver is now the default in Mentat.
- Shape memory alloy (SMA) Model for Beam and Truss Elements:
  - In this release, the SMA material model Thermo-Structural (2) has been made available for Beam and Truss elements.
- Result Quantity as an Independent Table Variable:
  - The coordinates, displacements and rotations of a node can be used now as independent table variables.

- ATAS and Model Sections:
  - Advanced Thermal Analysis Software (ATAS) is now supported by Model Sections.

Mentat

- Support new Marc functionality:
  - The above-mentioned Marc features are all fully supported by Mentat.
- Improved Filter for Tables and Results File Quantity Section:
  - The filters on the list of table variable types (Tables menu) and on the list of available result quantities (Job Results menu) update the list automatically if the filter text is changed.
- .obj File Format for 3-D Graphics
  - The WaveFront format, which is an open format for 3-D geometry definition, is now available for export in Mentat; such files can be opened in various third-party viewers.
- Abaqus and Nastran Translator Improvements:
  - The number of supported options has been increased.

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.

Changes to Initial and Boundary Conditions in Mentat

State variables allow one to store the values of user defined quantities at the integration points of the elements. These values are usually calculated by user subroutines. However, the first state variable of an integration point is reserved and contains the temperature at the integration point. It is used (among others) to evaluate temperature dependent material parameters at the integration points. In an analysis with a thermal pass, the first state variable cannot be prescribed using a boundary condition, since it is calculated from the temperatures at the nodes of the element. To reflect this distinction between the first and the other state variables, the **State Variable** boundary condition in Mentat has been removed and has been replaced by two new boundary conditions: **Element Temperature** and **User-Defined State Variable**. Likewise, the **State Variable** initial condition has been removed and has been replaced by two new initial conditions: **Element Temperature** and **User-Defined State Variable**. The **Element Temperature** conditions can be used to prescribe the first state variable of an integration point (the temperature) and are only available in analyses without a thermal pass. The **User-Defined State Variable** conditions can be used to prescribe state variables 2 and higher and are available in any analysis. **State Variable** initial and boundary conditions contained in existing models are automatically converted to the new types when the model is opened in Mentat 2021.2.

Complex valued initial and boundary conditions, such as those used in harmonic analyses, can be entered either by specifying the magnitude and phase, or by specifying the real and imaginary parts of the complex number. In previous Mentat versions, if one would enter the magnitude and phase and then switch to real and imaginary input, the values entered as magnitude and phase were interpreted as the real and imaginary values of the complex number which, given the different dimensions of the phase and imaginary part, is usually not correct. In Mentat 2021.2, the four values are stored separately in the Mentat model and can be changed independently of each other. Only two of these values will actually be used in the analysis (either the magnitude and phase, or the real and imaginary parts, depending on which input style is selected). Existing models are automatically converted to the new storage scheme when they are opened in Mentat 2021.2.

List of Known Defects in the 2021.2 Release

For more details on fixed and corrected defects please visit: MSC Marc and Mentat Error List

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-8766	In analyses with global remeshing, high gradients in the solution (e.g. as seen in some thermal analyses) may not be captured very accurately, which may cause noticeable differences between the solutions with and without global remeshing.
MARC-10114	In some cases, the segment-to-segment contact procedure with augmentation may report locally high friction stresses, while the friction forces are correct.
MARC-10533	In rare cases, if “Expanded Beam Post File” option is enabled via Job Results>Contact>Segment To Segment Contact, while post processing with the default scale factor, extended beam geometry may not be noticable.
MARC-11564	For some specific linear perturbation jobs, results may vary significantly depending on the contact algorithm used.
MARC-12637	Selecting the Near Contact Distance post code may significantly increase the stress recovery time if the specified near contact distance tolerance is very large.
MARC-12874	If use is made of Geometric Bodies with Nodes, and such Geometric Bodies come into contact due to a rotational movement, then the reported contact forces on these bodies might be incorrect (they typically might show very large values).
MARC-12555	When large sliding between the deformable and rigid body with segment-to-segment contact, contact area may not get updated.
MARC-13581	A beam-to-beam contact analysis using the node-to-segment algorithm may fail if nodal transformations are used.
MARC-13683	In some cases, the Version 2 Segment-to-Segment contact algorithm with default parameters may lead to relative large penetration.
MARC-15644	For a particular marc job with 2D contact analysis using deformable body and sheet body, penetration is observed. If sheet body is converted to NURBS, the job runs to completion.
MARC-16923	In rare cases, the segment-to-segment contact algorithm may show incorrect temperature results in case of non-congruent meshes along the contact interface.

Material

MARC-15386 There are two Thermo-Structural Shape memory alloy models that are represented as Thermo-Structural and Thermo-Structural (2). For the former, if a tension-unloading is applied, a strange drift might be seen in the stress-strain response, which is aggravated when the material is undergoing repeated loading-unloading cycles.

MARC-17222 In a harmonic analysis using the PRF material model (multi-network model), the stiffness of the secondary networks (viscoelastic and/or plastic) is currently not included in the stiffness matrix used in solving the harmonic subincrements.

Global Remeshing

MARC-15283 Changing element types during global remeshing may cause incorrect results (when performed after some loading) or a program termination (also when done at the start of the analysis). This includes changing from triangular elements to quadrilateral and vice versa. Some combinations work correctly, but there is currently no check for invalid combinations. A workaround is to change the element type during pre-processing instead, which is also a general recommendation.

MARC-15402 For a job that uses old style input and undergoes remeshing during the cutback process, may lead to incorrect displacement value. This issue is not observed if Table style input is used.

MARC-16902 If a job fails in global remeshing on account of issues with the original geometry, the diagnostic message is not very helpful.

MARC-17630 Curvature control in automesh surface may not generate the mesh correctly for quad or mixed element family.

MARC-17717 A 2-D analysis involving global remeshing may crash instead of issuing a proper error message if the mesh prior to remeshing is invalid.

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-12699 Prestate analysis does not work with thermal structural model of shape memory alloy. The stress and volume fraction of martensite is not transferred in prestate analysis. However, it works fine only when we use a structural model of shape memory alloy.

MARC-12855 In the sequential thermal/structural analysis with multiple types of element, if post file reversion 13 is used from thermal runs to structural run, structural analysis results may not be correct.
Workaround: Instead of post file revision 13, use default post file.

Parallel Processing

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.

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

MARC-17645 The results of a DDM Current/Thermal analysis may depend on the number of domains.

User Subroutines

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

MARC-13066 User subroutine VSWELL doesn't get called in a viscoelastic analysis.

MARC-16034 If the user outputs, the IBODY numbers for a HEXA element in the UFILM routine to fort.99 file, it do not match the numbers as defined in volume B. The numbers are usually off by 20. So instead of 1, the IBODY number is represented as 21.

Loads, Boundary and Initial Conditions

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

MARC-12870 If elements are deactivated during the former job, the Prestate option may fail with a misleading error message.
"error: either element types are not supported or element type in 2nd job does not match that in 1st job"

MARC-14124 For a particular Job with table driven input, if load controlled meshed rigid body with initial velocity is used, the job may exit with Exit 2008. With Old Style input, the job successfully runs to completion.

Other

MARC-10017 Writing iterative results to the postfile could change the simulation behavior in some cases, especially if the analysis is unstable. Furthermore the post files with iterative results can not be used in the pre state, axito3d, initial state and change state options.

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

MARC-11881 If material orientation is defined using Cylindrical or a Spherical Coordinate System, the orientations may not be retained.
Workaround: Define orientations using either edge or plane.

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

MARC-13950 For jobs with non positive definites, when run with CASI Solver, switches to Direct Solver (Solver 8).

MARC-13580 If user tries to submit the Marc job using DCOM on Win 10, it may not work.

MARC-14946 Hydrodynamic bearing is not supported with table input.

MARC-15183 For a particular model, flowline conditions are not honoured completely. This is at least visible for some duration of analysis.

Mentat

General

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-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-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-11210 If *image_save_graphics command is used in a procedure file and executed in background using the -bg option, the images are captured in black. If the command is used in foreground, it works correctly. This behavior is seen Win10 OS.

MARC-11633 Mentat creates negative geometry IDs after repeated BDF import. Such file when exported and run with Marc eventually fails with Exit 13, *** error - no material assigned to element number ...".

MARC-11918 When Mentat is invoked on UHD (Ultra High-Definition) resolution (3840x2160) screen, it may cause icons to be displayed as extremely small. Further for few forms, the text too may appear very small.

MARC-13055 In Main Menu >> Geometry and Mesh, if Mentat is not running in full screen mode, the options under Operations menu may overlap each other.

MARC-13643 In Marc 2019 FP1 and later releases, when using 3Dconnection space mouse at the end of each operation, the model jumps a bit - like invoking unintended zoom. This issue is not seen until the user uses the zoom option This works fine in Mentat 2019.
Workaround: Using FIT option improves this behavior temporarily.

MARC-13649 In a particular installation on Windows 10 with Marc Mentat 2018.1 with Japanese installation, ""QWindowsFontEngine: :QWindowsFontEngine: GetTextMetrics Failed ()"" messages are issued multiple times in mentat output console window. These messages do not impact any functionality/ usage and are harmless.

MARC-14892 Modifying menubar.xml and compiling main.msb may not work with default installation path.

MARC-15566 For a Marc dat file that has parasolid files associated with it, when imported in Mentat and if the associated parasolid files are not available, Mentat correctly issues the warning but mentat output console window indicates the count of number of warning message as zero.

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-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.

MARC-12478 Cohesive glue option is only available with thermal constraint. But still Mentat allows the user to set off the radio button for thermal constraint giving the impression that cohesive glue option has been selected without thermal constraint. This is only cosmetic error. When such analysis is run or if the Marc file is exported, it correctly sets the cohesive glue with thermal constraint on.

MARC-11230 The thickness direction of the composite element is defined using the orient option. In Mentat when orientation is applied to an element using curves, Y and Z directions are not displayed correctly.

MARC-17632 In rare cases, converting the edge of a Parasolid body to a NURBS curve may not work correctly.

Post Processing

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-12559 If a restart analysis is performed using a restart file from an analysis where a geometric contact body has been added (ADD RIGID option) and a continuous post file is requested, then this post file is corrupt and does not show incremental results when opened in Mentat.

MARC-11504 For a particular job, when post processing in Mentat, it is observed that the "Maximum Principal Value of Stress is smaller than the "Minimum Principal Value of Stress". When using "Translate" & "Off" in Element Extrapolation Settings and Isolate Elements, this behaviour is not observed.

MARC-11355 The option Draw Local Axes (Results → Model Plot → Beam Diagram Settings) can not be switched off during post processing.

MARC-11215 With different orientation of shell elements, nodal averaging result for “Principal value of Stress” values may be incorrect.

MARC-10325 For a Marc run in progress on linux machine, if t16 file is accessed through Samba Server on Mentat in Windows 10, *post_scan and *post_monitor works only for the increments which were already written to the postfile at the time when it was accessed and not the ones that were writtend after the file was accessed.

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

MARC-16685 A particular igs file when read in Mentat and if “Switch to Solid without line” option is used, it causes Mentat Program to terminate.

MARC-16755 A particular 3D autocad file fails to import in Mentat.

Other

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.

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

MARC-14082 This is reported for a some third party tool with the customer which helps them create Marc input deck. This tool is typically run on a remote server and starts Mentat with option ""-bg"" and initializes a DCOM interface. The tool executes the scheduled task. If the tool is initiated with the option ""Run only when user is logged on"" in works fine. But if the toll is initiated using ""Run whether user is logged on or not"" the DCOM connection fails. Mentat with a procedure file works for both conditions.

List of Fixed Defects in the 2021.2 Release

For more details on fixed and corrected defects please visit: MSC Marc and Mentat Error List

Marc

General

MARC-14806 In an analysis with a Global-Local boundary condition where a Time Shift is used to retrieve the data from the post file of the Global run, it was not possible to synchronize the Local time to the Global time (i.e. the time at the start of the Local run was always zero). Now an option is available to perform such a time synchronization for the Local run.

MARC-15159 In rare cases, a file called fort.16 file was created if a Marc model contains the HDFPOST option, but not the POST option.

MARC-17132 If a Marc data file contains parentheses, then on Windows Marc would fail to start if the analysis involves MPI (either because of DDM or MUMPS).

MARC-17430 If an analysis is launched from within Mentat using a non-existing scratch directory (defined in Job Properties > Run Job > Advanced Job Submission), the error message created by Marc was not written into the log file, so that it looked like that the analysis was hanging (in the Run Job menu, the Status showed Running without any further updates). Now such an analysis will finish with Exit number 8.

Contact

MARC-17114 Nastran-style MPC generated using the MPCOUT command in Marc were not correct for tetrahedral elements and caused the Nastran run to fatal out.

MARC-17429 If beam elements used in a segment-to-segment contact analysis are incorrectly defined, instead of printing an error message, the program could terminate prematurely.

Mesh Adaptivity

MARC-14678 Depending on e.g. the hardware being used or the condition of the problem, upon global remeshing finite element meshes could be different, in rare cases leading to different exit messages (e.g. successful completion versus a premature exit due to convergence issues). For planar and axisymmetric models, the hybrid contact algorithm is found to improve the robustness and avoids such premature exits.

MARC-16998 An analysis involving Joule heating, orthotropic materials with orientations and local adaptivity, gave wrong results (or did not converge at all) upon mesh refinement.

MARC-17281 If in a relatively large model (say over 50,000 nodes and elements) with local adaptivity boundary conditions are applied to many nodes, the computational time required to evaluate the boundary conditions (typically seen in the output file between “start of increment” and “start of assembly”) could be very long.

MARC-17386 Active nodes for finish temperature checks with adaptive multi-criteria based time stepping were not determined correctly when nodal boundary conditions that are used in the analysis are applied on these nodes.

MARC-17387 Material orientations were not transferred correctly from parent to child elements or viceversa for local adaptive meshing with subdivision or coarsening.

MARC-17637 In rare cases, Marc could stop prematurely during a Trimming load case.

Materials

MARC-16340 For a Pyrolysis material, a new method called “User Defined” gives the opportunity to enter the effective conductivity as a fixed value or a table depending on, for example, temperature or charred solid volume fraction.

MARC-17342 In a Mentat model that contains a streamline region used for the Streamline Pyrolysis Model and where a model section is imported with an extra streamline region, then if the number of edges/faces defining the region in the Mentat model was not correct, then the calculation of the pyrolysis (using the Streamline Pyrolysis Model) was wrong for the region in the model section.

MARC-17356 For the Vegter 2017 model, the R-values echoed in the output file were incorrect (this did not affect the results).

MARC-17578 When the material of 3-D solid elements uses any of the Barlat orthotropic plasticity models combined with kinematic hardening, the results of the analysis could be incorrect.

Multi Physics

MARC-16662 For harmonic Magnetodynamic analyses with thick wire coils without terminals, a slow convergence process could be observed, which could lead to wrong results if the convergence tolerance is not sufficiently tight.

MARC-17280 A coupled Magnetostatic/Structural analysis which uses the Maxwell Stress Tensor method could stop prematurely if the model contains an RBE2 element.

MARC-17608 In a magnetostatic analysis, Marc could give an incorrect warning message if a material orientation in a cylindrical coordinate system is used.

Performance/Parallel Processing

MARC-16460 Marc could terminate prematurely if a model in which nodes are attached to geometric points or to vertices of CAD bodies is run using single input file DDM (i.e. with the decomposition in domains done in Marc).

MARC-17348 In rare cases, a DDM analysis with segment-to-segment contact and the project stress-free option could stop prematurely.

Solver - Restart/Model Section

MARC-17771 If a Marc data file uses the IMPORT SEC option as well as the USDATA option, then the analysis would be terminated prematurely with exit number 24 if the imported Model Section does not include the USDATA option.

User Subroutine

MARC-17279 It is now possible to run Marc with user subroutines using the Intel oneAPI compiler environment.

MARC-17680 Results were incorrect if the post codes for velocity and acceleration are requested via user subroutines IMPD and NODVAR in a harmonic analysis.

Mentat

General

MARC-11742 In rare cases, plotting trimmed surfaces in solid mode without lines could cause Mentat to terminate prematurely.

MARC-17445 The Sweep Nodes and Sweep All commands in the Geometry & Mesh > Sweep menu did not merge nodes of RBE2's that are within tolerance of each other.

MARC-17684 If an RBE3 is duplicated using the commands in the Duplicate, Symmetry or Expand menus, then the copies of the nodes of the RBE3 were not assigned to the corresponding copies of the RBE3.

Marc Reader

MARC-17326 The Crack Specimen Length parameter (entered in the option CRACK DATA) could not be imported.

MARC-17351 If a Marc input file is imported that contains multiple streamline regions with different number of streamlines per region, then the number of edges/faces defining a region was not imported correctly, but was set to the maximum number of edges/faces in any region. This did not affect the results of a subsequent Marc job, unless the original input file also imports a model section file with a streamline region. In that case, the results for model section could potentially be wrong.

Marc Writer

MARC-12896 In a thermal stress analysis where the temperature is read from a single increment of a post file, Mentat did not write the correct data for the Change State option for load cases using the Auto Step option.

MARC-17755 If the sixth component of the INHERENT STRAIN boundary condition is table dependent, then the table ID was incorrectly exported to the Marc data file.

Pre Processing

MARC-16685 In rare cases, plotting trimmed surfaces in solid mode without lines could cause Mentat to terminate prematurely.

MARC-17446 The filters on the list of table variable types (Tables menu) and on the list of available result quantities (Job Results menu) did not update the list automatically if the filter text is changed. The Apply button had to be clicked to filter the list based on the modified text. The filters will now (re-)filter the list automatically and immediately when the filter text is changed. The Apply buttons are no longer needed and have been removed.

Thirdparty Import

MARC-17254 Following Abaqus keywords are supported now:

*VISCOELASTIC,TIME

*UNIAXIAL TEST DATA

*HYPERELASTIC, MARLOW

List of Build and Supported Platforms - Marc 2021.2 Release

Marc Platforms

Type	OS	Hardware	Fortran Version	Default MPI
Linux (64 bit)	RHEL 7.1/7.3/7.5/7.7 and SUSE 12 SP1/SP2/SP4	Intel EM64T or AMD Opteron Intel EM64T or AMD Opteron	Intel XE 19.04[1] Intel XE 19.04[1]	Intel MPI 2019 Update 10 Intel MPI 2019 Update 10
Windows (64-bit)	Windows 10 Windows Server 2016	Intel EM64T or AMD Opteron	Intel XE 19.04[1]	Intel MPI 2019 Update 9[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)	RHEL 7.1/7.3/7.5/7.7 and SUSE 12 SP1/SP2/SP4	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 2021.2 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 2021.2 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.