Marc® and Mentat® 2024.2

Release Guide

HEXAGON

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MA:V2024.2:Z:Z:Z:DC-REL-PDF

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C O N T E N T S

Marc and Mentat Release Guide

1 Overview

Introduction

The Marc 2024.2 release is the second Marc release in calendar year 2024. In this release, some new solver functionality is introduced and a number of defects found in past releases have been addressed.

Default Changes

Some important defaults have changed in this release. Existing models will use settings as before, but new models will use the new defaults.

- **Follower force option is on**

  For pressure and other distributed loads, the default is now that the load direction will follow the deformations. Also, the option in Mentat to set this option has been moved to the same menu level as for setting large or small strain. Point loads and similar are not affected by this change.

- **Accelerated contact separation checking is on**

  If a tighter than default convergence setting is used, then separation is checked when 10% residual convergence is obtained to speed up the analysis.

- **Cholesky Preconditioner for the sparse iterative solver**

  This preconditioner is mostly the best choice, and it is now used by default when this solver is used.

Contact Changes

The current default contact method is the Standard node-to-segment option. We are moving towards the Hybrid node-to-segment method as the method of choice. In the current release, many improvements to the Hybrid method have been made and there are several advantages over the Standard method. However, some disadvantages remain. In general, it is recommended to use the Hybrid method. The menu has been modified to make it more visible, and it has now been made easier to set it as the default method.

Overview of New Functionality

The new functionality in Marc 2024.2 can be summarized as:

- Support of a fluid pressure penetration functionality.
- Recession with multiple pyrolysis material layers.
- Multi-threading support for radiation view factors.
- Pre and post processing enhancements like constant arrow length vector plots and path plots as a function of coordinates.

Details can be found in the What's New section of the Mentat help.

Marc 2024.2 is based upon the compiler version oneAPI v 2023.1. Details can be found in the Mentat Platforms. Marc 2024.2 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.

Important Compiler Note

Intel is deprecating the compiler called **ifort** in 2025. This compiler has been used for all Marc releases in recent years. Marc 2024.2 will be the last release using ifort. Intel is replacing it with a new compiler called **ifx**, and this compiler is not compatible with **ifort**. **It is strongly recommended to download the Intel oneAPI 2024.2 compiler while it is available for free from Intel**. From 2025.1 onwards, Marc will use the **ifx** compiler. The following table shows the compatibility for the Marc releases.

Marc Version	Intel OneAPI 2023.1	Intel OneAPI 2024.x	Intel OneAPI 2025.x
Marc 2024.2	Yes	Yes	No
Marc 2025.1	No	Yes	Yes

Cosim Compatibility

Linux Platform:

- The Marc 2024.2 version is not compatible with Cosim 2024.1 for use together with Adams or scFlow.
- It will be possible to use Marc 2024.2 together with Cosim 2024.2 which is due to be released in Q1 2025. Until then, Marc 2024.1 can be used together with Cosim 2024.1.

Windows Platform:

- The Marc 2024.2 version can be used with Cosim 2024.1.

Deprecated Functionality

The Windows network DDM option is no longer supported.

Upcoming Changes

In 2025 a new revision of the Marc t16/t19 file format will be introduced. This revision will support units. The HDF format will also support units, but no new revision will be needed.

List of Known and Corrected Defects in the 2024.2 Release

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

List of Build and Supported Platforms - Marc 2024.2 Release

Marc Platforms

Type	OS	Hardware	Fortran Version	Default MPI
Linux (64 bit)	RHEL 8.8/9.2 and SUSE 15SP4	Intel EM64T or AMD Opteron	oneAPI2023.1 [2]	Intel MPI 2021.10.0
Windows (64-bit)	Windows 10 [1] Windows Server 2022	Intel EM64T or AMD Opteron	oneAPI2023.1 [2]	Intel MPI 2021.10.0

[1] Also works on Windows 11.

[2] When using user subroutines, oneAPI 2023.1 or 2024 and Visual Studio 2022 must be installed.

Mentat Platforms

Vendor	OS	Hardware
Linux (64-bit)	RHEL 8.8/9.2 and SUSE 15SP4	Intel EM64T or AMD Opteron
Windows (64-bit)	Windows 10 Windows 11 Windows Server 2022	Intel EM64T or AMD Opteron

On Linux, GLX version 1.3 or higher is required to run Mentat on screen resolutions higher than 2560x1440. To find the GLX version on the machine, please use the following command:

```
glxinfo | grep "GLX version:"
```

If the GLX version does not meet the requirement, then as a workaround, the X server or VNC server can be run in 16-bit color mode by providing the -depth option, as follows:

```
vncserver -depth 16
```

All platforms support Python 3.11.6

Mentat Graphics Card Support

The following graphics boards have been certified to work with the Mentat 2024.2 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

Graphics Board	Graphics Driver Version
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
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
AMD Radeon Pro W6600M	31.0.12026.3004
AMD Radeon Pro W6800	31.0.21018.4006
Intel Arc™ Pro A60M Graphics	31.0.101.4648
Nvidia Quadro M1000M	10.18.13.5461
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

Graphics Board	Graphics Driver Version
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
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
Nvidia T600	30.0.15.1298
Nvidia T400	31.0.15.3799
Nvidia RTX T550	31.0.15.1713
Nvidia RTX A500	31.0.15.1713
Nvidia RTX A1000	30.0.15.1298
Nvidia RTX A2000	31.0.15.2667
Nvidia RTX A3000	30.0.15.1298
Nvidia RTX A4500	31.0.15.2667
Nvidia RTX A4000	31.0.15.3799
Nvidia RTX 2000 Ada Generation	31.0.15.3696

Graphics Board	Graphics Driver Version
Nvidia RTX 3500 Ada Generation	31.0.15.2908
Nvidia RTX 4000 Ada Generation	31.0.15.3696
Nvidia RTX 5000 Ada Generation	31.0.15.3696

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 2024.2 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.

2 Previous Release Highlights

2024.1 Release Highlights

The functionality in Marc 2024.1 can be summarized as:

- Support of units.
- Temperature-dependent superelements.
- A new nonlinear friction model.
- The previous state analysis option can now do more general mapping, including from Simufact.
- Enhanced material data fitting for temperature dependent elastomers.
- Improvements to hybrid contact.

2023.4 Release Highlights

The functionality in Marc 2023.4 can be summarized as:

- Improved performance of Mentat.
- Cracking energy density based fatigue analysis for elastomers.
- Higher order elements and thin sections in remeshing.
- Secant coefficient of thermal expansion.
- Temperature and contact pressure induced bonding.
- Structural increment frequency control in Diffusion (Pressure)/Thermal/Structural analyses.
- Position of the Triad.