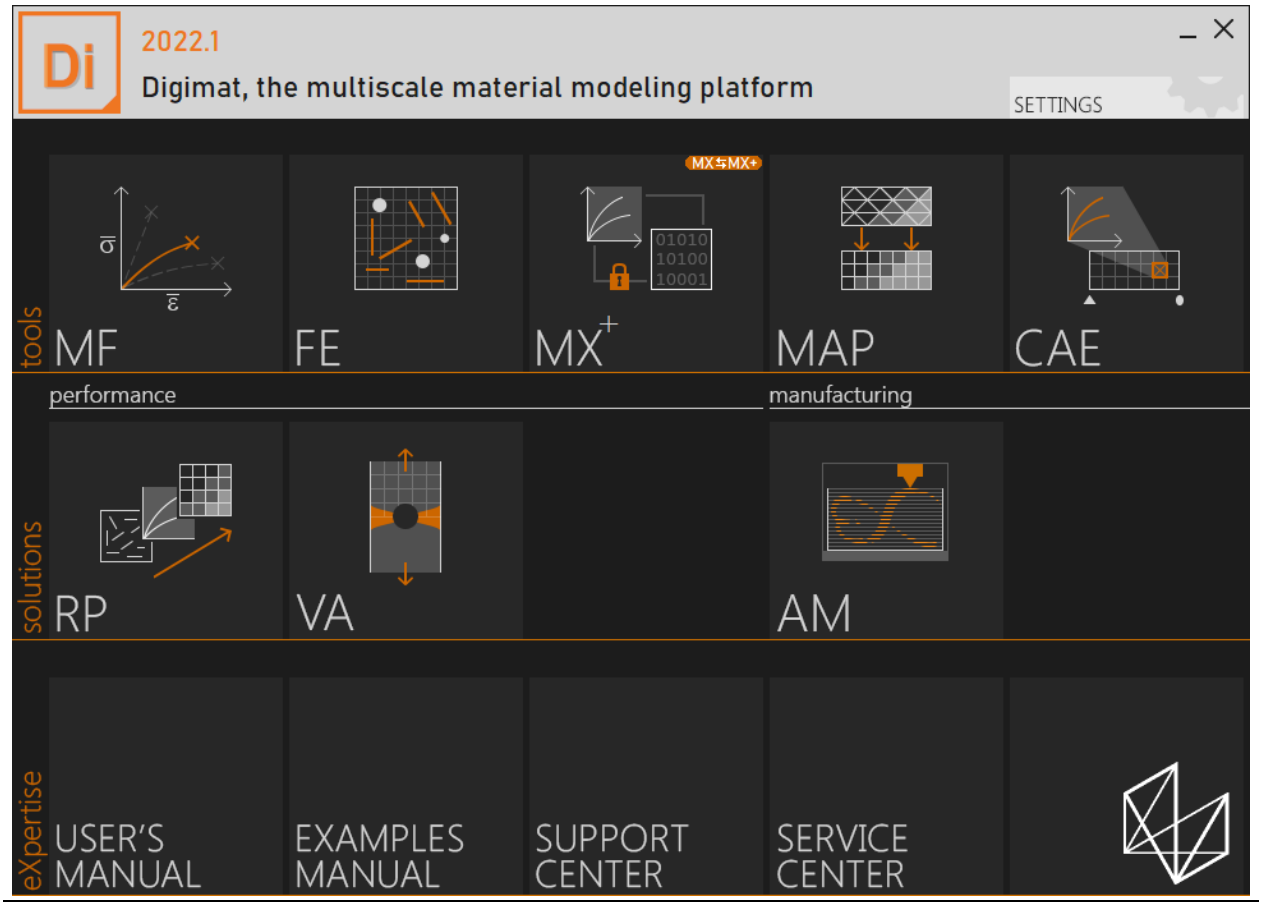
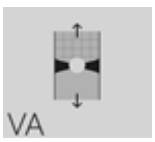
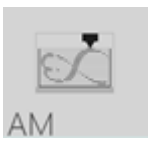
Digimat

Digimat 2022.1 – April 2022





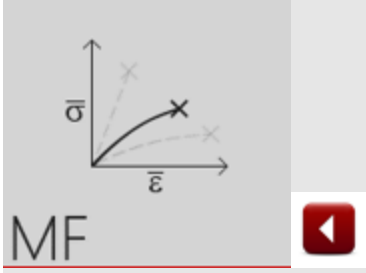


Licensing, installation, and transversal functionalities

- Digimat-AM standard licenses have been retired, users with existing standard license will have access Digimat-AM Advanced capabilities.

Known issues

- Pasting data to input tables in Digimat Platform, Digimat-MF, Digimat-FE, Digimat-MAP, Digimat-MX, and Digimat-CAE graphical user interfaces may lead to abnormal termination of these products.



back to top

New capabilities

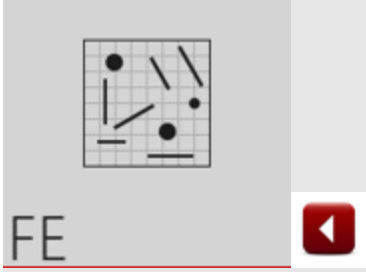
- **Support for piecewise linear hardening function**
  - For improved generation of forming limit diagrams, we've added support for a piecewise linear hardening function. The required inputs now will better match with what you would expect from Forming Suite or Simufact Forming.
- **New energy-based fatigue criteria**
  - We've introduced a new energy-based fatigue criteria based on our work in the EU-funded IDAFIP project for short fiber-reinforced polymers. The new model allows for understanding fatigue of materials with a significantly reduced set of physical tests, mean stress sensitivity can be captured with as few as two different load ratios.
- **Incremental formulation for accumulated plastic strain failure criteria**
  - To better handle thermal shock workflows, we've added improved support for an incremental formulation of accumulated plastic strain failure criteria.
- **Support for coupled thermomechanical analysis**
  - Digimat-MF now supports coupled thermomechanical analysis to enable you to better account for the influence of temperature dependent properties on mechanical performance. It is currently only supported for unidirectional composite and homogeneous material.
- **Support for crystallinity**
  - In order to allow you to understand the influence of temperature cycle on crystallinity and the influence of crystallinity on the performance of your material. It is currently only supported for coupled thermomechanical analysis.
- **Usability improvement for cyclic loading**
  - A load ratio input has been added in the definition of cyclic loading.

Improvements

- **Support all orientations for conductivity computations of SFRP**
  - Previously you could only compute conductivity for certain orientations of transversely isotropic fibers, this limitation has been removed.
- **New result for fatigue**
  - You can now obtain Smax as a result from Digimat-MF when performing fatigue analysis.

Known issues

- When using a multilayer microstructure containing a layer modelled as a homogeneous material, the results in the results file associated with the matrix of the corresponding layer are not correct. A possible workaround is to define a fake reinforcing inclusion with a negligible volume fraction.



back to top

Improvements

- **Improved memory efficiency of FFT solver for linear analysis**
  - The FFT solver should see decreased memory consumption for linear analysis, a decrease of 50-75% can be expected depending on the type of analysis.
- **Usability improvement for cyclic loading**
  - A load ratio input has been added in the definition of cyclic loading.

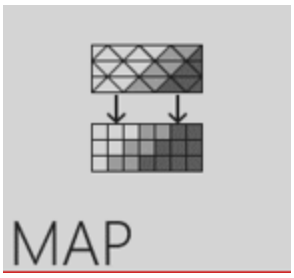
back to top

New Capabilities

- **Overhaul of Reverse Engineering for Failure and Strength**
  - The workflow for reverse engineering of failure and strength properties has been overhauled to greatly improve the usability based on customer feedback. Users will now find a streamlined workflow with dedicated steps for FEA validation, and the automatic carry through of settings when appropriate.
- **Support for Reverse Engineering for Tsai-Hill 3D failure criteria**
  - A new workflow for reverse engineering with Tsai-Hill 3D failure criteria which is suitable for additively manufactured materials.
- **New and Updated Materials**
  - New grades have been added from LGChem, Domo, Kurarary, Victrex, TER, Stratasys, and Markforged.
  - Additive manufacturing materials from DSM have been changed to Covestro branded.
  - Material grades have been removed from Dupont and SolvaySP.

Known issues

- When loading .dsg files, the geometry name is not properly imported and need to be re-defined by the user.



back to top

New Capabilities

- **Support for CADMOULD warpage Results**
  - CADMOULD is now a supported source of warpage data to be used from mapping from solid to shell meshes, only data from result ID 121 will be loaded.

Improvements

- **Improved accuracy of solid to shell mapping**
  - A new algorithm has been implemented for solid to shell mapping that will improve the accuracy of the thickness values report. In addition, users can now specify a maximum thickness in their part to limit the extent of thickness in areas where it can be difficult to accurately compute.
- **Support for unreferenced nodes**
  - Previously nodes that were not referenced by a material were removed from the FEA input deck that was output from Digimat-MAP. In order to allow for use of RBEs and other connectors, unreferenced nodes will no longer be removed.

Known issues

- Digimat-MAP doesn't support weld line files that are exported from Moldflow software using other language than English (file must contain the keyword 'Time').

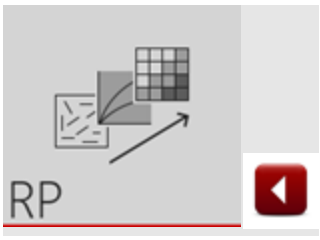
back to top

New Capabilities

- **Updated support of the existing interfaces with CAE software:**
  - Addition of CAE software
    - Abaqus 2022
    - ANSYS 2022R1
    - LS-DYNA R12.1
    - Marc 2021.4
    - nCode 2022.0
    - CAEfatigue 2021.4
  - Removal of CAE software
    - Abaqus 2019
    - Marc 2019.1
    - nCode 2020.0
    - Ansys 2019 R3
    - LS-DYNA 9.3 and R11.2.1
- **Support for coupled thermal mechanical analysis with and without crystallinity**
  - In order to allow you to understand the influence of temperature cycle on crystallinity and the influence of crystallinity on the performance of your material. Currently only Marc is supported at this time.
  - To enable solving for crystallinity, coupled thermal-mechanical analysis is now supported.

Improvements

- **New option to request CTE output for Hybrid ThermoMechanical analysis (UD and SFRP).**



back to top

New Capabilities

- **Initial support for CFRP analyses**
  - Digimat-RP now allows you to run certain types of analyses for continuous fiber reinforced components from Digimat-RP where fiber orientation is already defined.
    - Analyses to investigate curing can be set up to run in Abaqus, Marc, and Ansys Mechanical.
    - Analyses utilizing elastic and elasto-plastic materials for CFRP components can run using a micro or hybrid solution in Marc, Abaqus, and ANSYS Mechanical.
    - Analyses utilizing progressive failure (standard and camanho) for CFRP components can be run using Marc and Abaqus.
- **Support for thermal shock workflows**
  - Digimat-RP now supports running thermomechanical analysis when thermal results come from an existing FEA result file.
  - You can now specify materials with an accumulated plastic strain failure criteria which is suitable for determining failure due to thermal shock in SFRP components.
- **Superposition enhancements**
  - A new method for performing manual superposition using 3 points has been added to Digimat-RP, users of Digimat-MAP will already be familiar with this capability.
  - A quality metric on superposition is now provided to enable users to make more informed choices about improving the quality of their superposition.

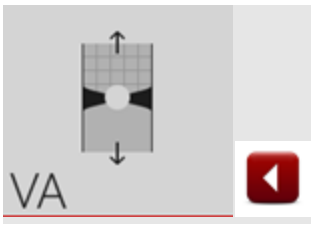
Improvements

- **Automatic superposition**
  - The quality of automatic superposition results has been improved to provide better matching percentage.
- **Import meshes from RP/Moldex**
  - You can now import meshes in .msh format that are generated from Digimat-RP/Moldex to Digimat-RP to avoid needing to re-run the fiber estimator.
- **Support for FREQ3, FREQ4, and FREQ5 Nastran card**
  - Previously input decks containing FREQ3, FREQ4, FREQ5 cards had these cards ignored, these cards are now supported.
- **New option to request CTE output for Hybrid ThermoMechanical analysis (UD and SFRP).**

Known issues

- When exporting an animation or screenshot one may experience issue when using a transparent background, it is recommended in this case to use an opaque background.
- Digimat-RP doesn't support weld line data that are exported from Moldflow software using other language than English (file must contain the keyword 'Time').
- When using 3D TIMON injection files with shell elements, there is a discrepancy between strong coupling and macro solution:
    - When using strong coupling solution, thicknesses of shell elements will be the one of structural mesh.
    - When using macro solution, thicknesses of shell elements will be the one of injection mesh.

  This can lead to differences in results in case of important differences between thicknesses defined for injection mesh and thicknesses defined for structural mesh.



back to top

New Capabilities

- **Addition of curved beam strength (CBS) in the Digimat-VA tests database**
  - A new curved beam strength test for interlaminar strength has been added to the test database, this test is supported with both the Digimat-VA solver and Abaqus/Explicit.

Improvements

- **Combability checks for Abaqus**
  - Digimat-VA will now check if you have a version of Abaqus installed that is compatible with Digimat-VA, and provide you information if not.

Known issues

- In case of errors during the porous material properties calibration process (using Digimat-FE from Digimat-VA, when performing defect study with intra-ply or inter-ply porosities), all errors are not correctly reported in the Digimat-VA log file.

back to top

New capabilities

- **SLS Accuracy Improvements**
  - You can now define time dependent boundary conditions to better account for changes in the thermal conditions over the course of the print and cooldown cycle.
  - The Iterative Sparse solver enables the usage of domain decomposition that increases the solver scalability.
- **Improved usability**
  - A large number of changes have been made in the user interface to improve your overall user experience and to simplify the steps required to get to having successful results.
- **SLS build cooldown utility**
  - In result post-processing for SLS, you can now determine the time it will take for an SLS build to cooldown to a user defined temperature to ensure part quality and enable safe unpacking.
- **New annealing step**
  - You can now take into account the annealing of material after the printing process with a user configurable annealing step.
  - This step will only provide meaningful results when using a TVE or crystalline material.
- **New low fidelity SLS methodology**
  - A new methodology replaces the previous inherent strain methodology for SLS, which will enable faster and more accurate analyses compared to the previous methodology.

Improvements

- **Improved determination of state of matter**
  - Previously when using mesh coarsening certain elements could be considered unmelted even though they contained printed material, improvements have been made to allow you to better capture the crystallinity in such situations.

Notes

The Material Modeling Company

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