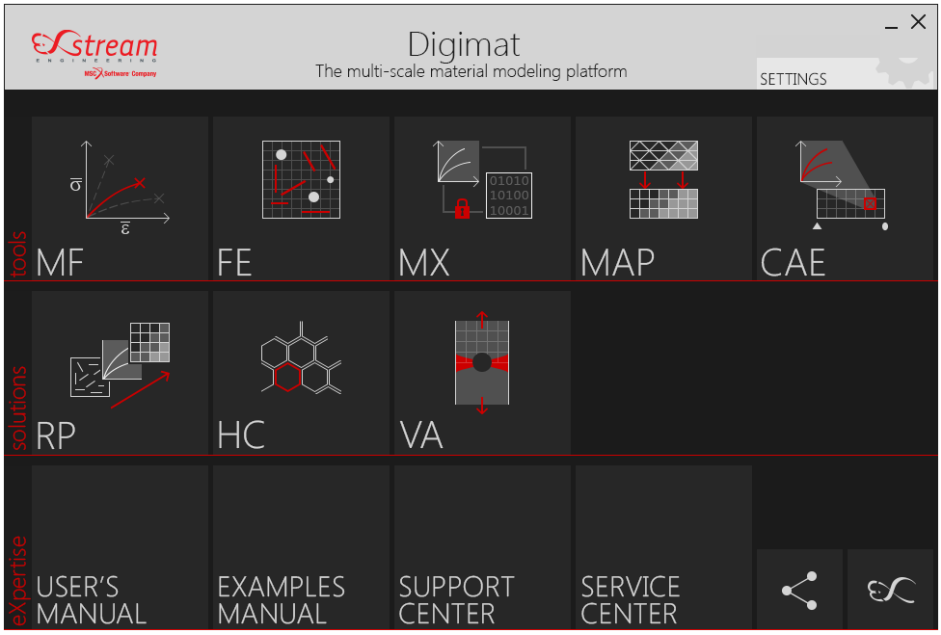
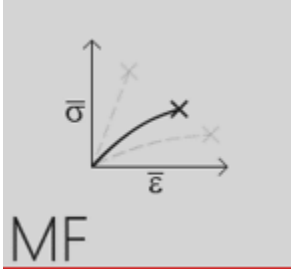
Digimat

Release Notes 2016.1 – June 2016





back to top

New Capabilities

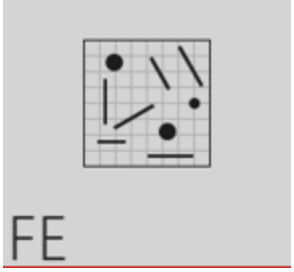
- **Improved robustness of Drucker-Prager model**
  - Convergence improvement
  - Default value change
    - Dilatation angle set to 0 by default

- **New harmonic analysis**
  - Definition of frequency dependent viscoelastic material properties
  - Definition of harmonic loadings
    - Harmonic strain
    - Harmonic stress
  - Homogenization and plot of frequency dependent properties
    - Real part
    - Imaginary part

- **New relative tolerance for homogenization schemes to improve convergence**
  - New default parameter
  - Independence of tolerance value regarding implicit/explicit CAE

- **Revised pseudo-grain fatigue failure indicator definition**
  - Migration of reverse engineering capability to Digimat-MX
  - Definition of failure indicator via pseudo-grain S-N curves
  - Retro-compatibility ensured for Digimat analysis files from previous versions
    - Automatic reverse engineering still performed in Digimat-MF

- **Improved SFRP fatigue analysis**
  - Full equivalency of amplitude and cycle based loadings
  - Support of mean-stress sensitivity model with amplitude loadings
  - New default log-linear extrapolation between minimum and maximum number of cycles to improve robustness of reverse engineering



back to top

New Capabilities

- **Extension of Digimat-FE/Modeler**
  - Internal mesher (conforming and voxel) now also available for
    - Abaqus/Standard
    - ANSYS
    - LS-Dyna/Implicit
  - Including support of fabrics and discontinuous fiber composites
  - Export of FEA model and job monitoring
  - Full workflow available in command line
  - Limitation
    - Post-processing for LS-Dyna is not available inside Digimat-FE

- **New failure capabilities to predict strength of RVE**
  - Available for Marc and FE solver
  - Definition of stress based failure indicators at the material level
    - Component
    - Von Mises
    - Tsai-Hill 3D transversely isotropic
    - Tsai-Wu 3D transversely isotropic
    - Hashin 3D
  - Computation of damage based on failure indicator
  - New outputs post-processing
    - Failure indicator
    - Damage
  - Available for all microstructures
    - Including fabrics

- **User interface robustness improvement**
  - Enhanced stability

- **Usability improvement**
  - Centralization of all geometry parameters in a single screen to simplify successful geometry definition
  - New default geometry parameters to improve meshing step
    - Minimum relative distance between inclusion set to 5%
    - Minimum inclusion relative volume set to 5%
  - Simplified workflow to define discontinuous fiber composites
    - Definition of new type of phase: strand

- **New plasticity model for yarn to model non-linear behavior of fabrics**
  - Yarn plasticity model automatically defined based on matrix elastoplastic model, fiber elastic model and yarn microstructure
  - Available for Abaqus/Standard, ANSYS, FE solver and Marc
  - Available for all fabric types

- **New auto-save of Digimat-FE session to ensure backup of model setup**
  - Material definition
  - Geometry
  - Mesh

- **Support of pressure dependent plasticity material model for Abaqus/Standard**
  - Definition of Drucker-Prager model

- **New meshing option for improved mesh quality**
  - Continuous meshing strategy (shared node) available for conforming mesh
  - Applicable to basic RVE geometry
  - Not available for RVE involving coatings and interfaces

- **Support of SMP with FE solver**
  - Identical licensing as DMP

back to top

New Capabilities

- **New automatic reverse engineering to speed up and simplify material model creation**
  - Fully automatic reverse engineering methodology
  - Required input data required limited to experimental data (stress-strain curves)
    - No need of a Digimat analysis file template
  - Available for experimental data associated to SFRP materials ("chopped fibers (short)" type of grades)
  - Available performances and related models
    - Linear stiffness/ elasticity
    - Non-linear stiffness / plasticity
    - Non-linear stiffness + failure / plasticity + FPGF
  - Speed-up of reverse engineering via support of multiple CPUs
  - Review of model parameters with reverse engineering report
  - Previously existing reverse engineering methodology renamed as "interactive"

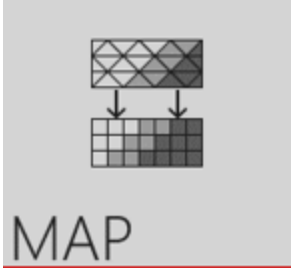
- **Extension of interactive reverse engineering**
  - Drucker-Prager model for calibration of pressure dependent plasticity model
    - Optimization restricted to yield function coefficient
    - Yield stress exponent and dilatation angle are set to recommended value to ensure model robustness
  - Speed-up of reverse engineering via support of multiple CPUs

- **Simplification of local database installation and usage**
  - Installation of local database when installing Digimat
  - Direct access to database content when opening Digimat-MX
    - Database management tools accessible inside the main Digimat-MX window

- **New fatigue capabilities**
  - Import and plot of S-N curves
  - Import and plot of SFRP pseudo-grain fatigue material model
  - Reverse engineering of SFRP pseudo-grain fatigue failure model
    - Migration from Digimat-MF to Digimat-MX

- **Extension of unit conversion tool**
  - Support of material models including Hybrid parameters
    - Non crypted
    - Encrypted

- **Database content**
  - Solvay Engineering Plastics
    - Material models now available every 5°C instead of 10°C



back to top

New Capabilities

- **Revised mapping algorithm to reduce mapping CPU time**
  - 70-95% reduction of CPU time for mapping
  - Applicable to all type of elements and data

- **New data merge tool to create a single file from multiple files of same type of data**

- **Improved graphical performance when displaying large models**
  - Instabilities may be observed for graphical configurations using old driver versions

- **Support of new elements**
  - Abaqus
    - C3D10I (orientation data stored at element level in 2016.0, now stored at integration point level)
  - ANSYS
    - SOLID285
  - LS-Dyna
    - Type 16 and 17 (10 nodes tetrahedral with 5 integration points)
    - Type 16 (fully integrated shell elements)

- **New draping capabilities**
  - Extension of mapping to multilayer draping files & UD orientation files
  - Visualization of yarn shear angle when displaying orientation data for woven
  - New interface to Aniform

- **Interface to PAM-RTM**
  - Mapping of porosity data to receiver mesh
  - Available for 3D models only
    - PAM-RTM
    - receiving mesh

- **Support of odd number of layers in shell models**

back to top

New Capabilities

- **Support of SMP parallelization scheme**
  - Support of implicit FEA codes
    - Abaqus/Std
    - Ansys
    - Marc
  - Reduced memory consumption
  - Support of mixed DMP/SMP parallelization scheme
  - Identical licensing as for DMP

- **New pressure sensitive elastoplasticity model**
  - Available with the Hybrid solution for efficient and robust coupling with FEA
  - Drucker-Prager model from Digimat-MF required as input

- **New basic SFRP fatigue solution**
  - Fatigue failure indicator (number of cycles to failure) available as output state variable in Digimat coupled analysis
  - Available for all implicit FEA codes
  - Available for solid & shell elements

- **Reduced CPU time in explicit/shell/Hybrid configurations**
  - 10% CPU time reduction

- **Revised thermo-elastoplasticity model for the Hybrid solution**
  - Improved accuracy of CTE (Coefficient of Thermal Expansion)
  - Constituent CTE used as input for the Hybrid solution must have been reverse engineered from a thermo-elastic model

- **Extension of NVH capabilities with Marc**
  - Anisotropic and frequency dependent damping based on local microstructure

- **Support of new versions of the existing interfaces**
  - Abaqus 2016
  - ANSYS 16.2 and 17
  - PAM-CRASH 2015
  - Marc 2015.0

- **Support of new elements**
  - Abaqus
    - C3D10I (orientation data stored at element level in 2016.0, now stored at integration point level)
  - ANSYS
    - SOLID285
  - LS-Dyna :
    - Type 16 and 17 (10 nodes tetrahedral with 5 integration points)
    - Type 16 (fully integrated shell elements)

- **Interface to Ansys Fluent**
  - Computation of local SFRP thermal conductivities based on local microstructure
  - Available in command line only

Bug Fix

- **Bug fix in PAM-CRASH & Radioss**
  - Configuration
    - Shell formulations involving several integration points per layer
    - Hybrid solution procedure
  - Previous behavior
    - For each layer, orientation data used was the one of the first integration point
  - Fixed behavior
    - Each integration point now uses correctly its assigned orientation data

back to top

New Capabilities

- **Automatic reverse engineering**
  - Available for SFRP
  - Import of stress-strain data curves
    - Text file
    - Copy/paste
  - Available performances and related material models
    - Linear stiffness/ elasticity
    - Non-linear stiffness / plasticity
    - Non-linear stiffness + failure / plasticity + FPGF
  - Speed up of reverse engineering via support of multiple CPUs
  - Review of material model parameters

- **Orientation file merge tool**
  - Available for mapped orientation files

- **Extension of unit conversion tool**
  - Support of material models including Hybrid parameters
    - Non crypted
    - Encrypted

- **Support of SOL108 & SOL111 for Nastran 2016.1**
  - 15% faster SOL108 solution compared to Digimat 2016.0 + Nastran previous versions
  - 500-600% faster SOL111 solution compared to Digimat 2016.0 + Nastran previous versions

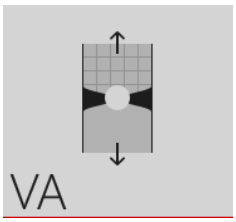
- **Support of SMP**
  - Choice between SMP and DMP scheme upon job submission

- **Support of new SFRP fatigue capabilities**
  - Loading and visualization of fatigue material model
  - Definition of fatigue related parameters for standalone Digimat fatigue analysis

- **Updated Moldex3D API for Digimat-RP/Moldex3D**
  - Upgrade to Moldex3D R14

Known limitations

- **When loading some Abaqus assembly models in Digimat-RP and adding Digimat material models on one or several parts, erroneous element numbering may occur in the fiber orientation files, leading to FEA analysis preprocessing error**
  - If issues are encountered, it is advised to switch to a flat input deck definition before loading FEA model inside Digimat-RP



back to top

New Capabilities

- **New filled hole test**
  - Bolt or countersunk fastener type
  - Tension and compression loading

- **New smart analysis stop upon load drop**

- **New VADB migration tool**
  - Import data from previous VADB during Digimat installation

Additional info

- **Shift to new FlexLM version (v11.13) for license server**
  - Available under Linux & Windows

Known limitations

- **Graphical instabilities may occur when using graphic card not compatible with OpenGL 3.3, notably when using Windows remote desktop**
  - If issues are encountered, please contact support@e-xstream.com to receive a patch correcting instabilities for OpenGL 1 graphic card configurations and beyond. Please note that patched version is offering lower graphical performance, notably for visualization of big FEA models in Digimat-MAP.

The Material Modeling Company

VISIT
www.e-Xstream.com

INFO REQUEST
info@e-Xstream.com

TECHNICAL SUPPORT
support@e-Xstream.com

Support hotline: +32 10 81 40 82

