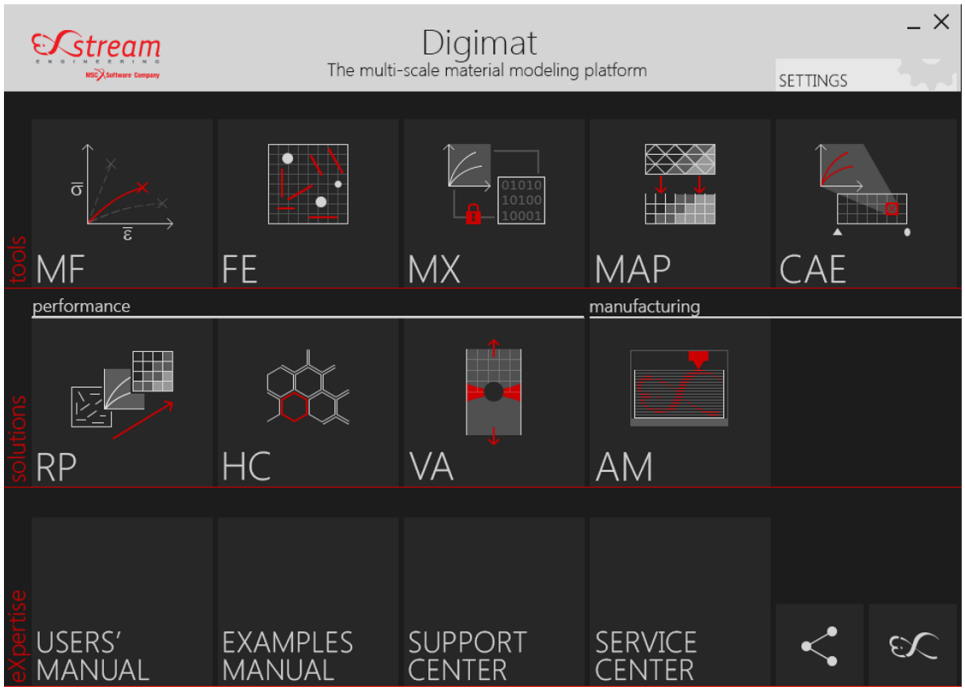
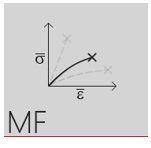
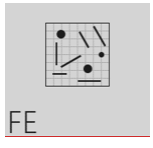
Digimat

Release Notes 2018.0 – December 2017





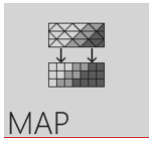
p. 2



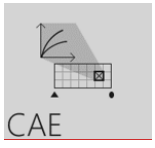
p. 3



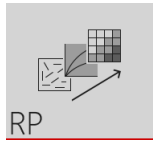
p.5



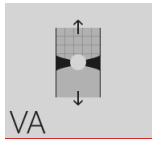
p. 7



p. 9



p. 12



p. 14



p.15

Copyright © 2017 MSC Software Belgium SA



back to top

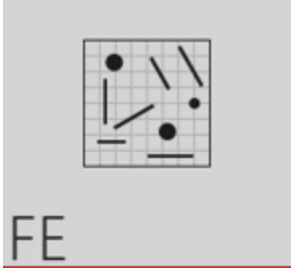
New Capabilities

- **Accumulated plastic strain failure indicator**
  - Critical accumulated plasticity as a function of stress triaxiality
  - Additional output: stress triaxiality in the matrix phase
  - Also available for structural analysis with Digimat-CAE and Digimat-RP

- **Improved workflow for microstructure definition of fabrics**
  - Dedicated microstructure type

- **New lattice microstructure type**
  - Applicable to model Fused Filament Fabrication dense microstructures (non-reinforced)
    - Filament cross section definition and visualization
    - Filament orientation
  - Supports Standard failure definition (Composite level)

 Copyright © 2017 MSC Software Belgium SA



back to top

New Capabilities

- **More efficient post-processing through automatic computation of engineering stress-strain curve**
  - Available for all RVE applications, including void phases and/or cohesive elements

- **Custom weave pattern definition for woven 3D materials**
  - Available for 3D interlock
  - Graphical editor for weave pattern definition

- **Improved workflow for microstructure definition of fabrics**
  - Dedicated microstructure type

- **New lattice microstructure type**
  - Flexible infill definition
    - Aligned (Fused Filament Fabrication application)
    - Sparse (Fused Filament Fabrication application)
    - Double dense sparse (Fused Filament Fabrication application)
    - Hexagonal (Fused Filament Fabrication application)
    - Custom 2D (Fused Filament Fabrication application)
      - Custom definition of microstructure via beams and junctions
    - Custom 3D (All applications)
      - Custom definition of microstructure via beams and junctions
  - Available for non-reinforced and reinforced materials
  - Available for elasticity and plasticity constitutive models

- **User defined failure indicator** (only available with Digimat-FE/Solver)
  - Custom failure library to be built by user
  - Instantaneous stiffness reduction is available

 Copyright © 2017 MSC Software Belgium SA

- **Enhancements for microstructures including curved sphero-cylindrical inclusions**
    - Phase definition now available based on inclusion size, diameter and number of inclusions (leading to inclusion volume fraction computation)
    - More robust geometry and mesh visualization for very large microstructures
        - Geometry visualization through 1D beams and manual mesh generation if estimated mesh size is higher than 1.7M elements
    - Cohesive element definition now possible between matrix and inclusion phase
        - Available for Abaqus, Marc and FE/Solver

- **New visco-hyperelasticity model**
    - Available for Abaqus, Marc and FE/Solver
        - Abaqus models
            - Neo-Hookean
            - Mooney-Rivlin
            - Ogden
            - Storakers
        - Marc and FE/Solver models
            - Neo-Hookean
            - Mooney-Rivlin
            - Ogden

Notice

Digimat-FE export functionality via script (interface to Abaqus/CAE and ANSYS Workbench) is deprecated. Users are advised to use the standard Digimat-FE mesher option as method for FEA model creation.

 Copyright © 2017 MSC Software Belgium SA



back to top

New Capabilities

- **Naming update**
  - The reverse engineering method "Tensile" is now named "Static and dynamic"

- **Handle shear data**
  - New experimental data loading: shear
  - Experimental data usable for reverse engineering with Static and dynamic method as well as for failure indicator reverse engineering

- **Data ordering filtering**
  - New filtering possibilities in Digimat-MX tables (Grades, Digimat Analysis Files, ...) accessible via direct right-click

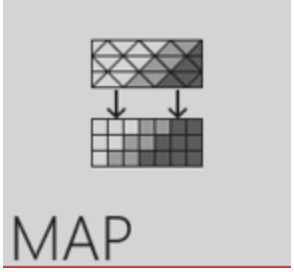
- **Reverse engineering for LFRP**
  - New through-thickness definition of fiber aspect ratio and fiber volume fraction in multilayer microstructure definition

- **Reverse engineering for multiple multilayer**
  - Enhanced flexibility for microstructure definition associated to each experimental curve used during reverse engineering
  - Each experimental data can be associated to a different multilayer microstructure
  - Dedicated multilayer failure controls per microstructure

 Copyright © 2017 MSC Software Belgium SA

- **Update of public database**
  - Asahi Kasei
    - New material supplier
  - DSM
    - 11 new grades
  - Dupont
    - 15 new grades
    - 20 new models for existing grades
  - Radici Performance Plastics
    - 4 new grades
  - Sabic
    - 2 new models for existing grades
  - Solvay Specialty Polymers
    - 8 new grades
  - Stratasys Inc
    - New supplier for additive manufacturing

 Copyright © 2017 MSC Software Belgium SA



back to top

New Capabilities

- **Manufacturing data support update**
  - Molding
    - Moldflow 3D results
      - Weld line and weld surface data
      - Fiber length
      - Porosity
    - 3D Timon results
      - Fiber length
    - Moldflow UDM mesh format
    - Residual stresses
      - Export extended to LS-Dyna and Marc
  - Additive manufacturing
    - Stratasys Insight results
      - Toolpath (.txt)

- **Weld line mapping**
  - Export of Digimat weld line file now available in addition to element set export

- **Automatic Fiber Placement**
  - Loading and visualization of IGES files from AFP manufacturing software
  - Mapping to shell receiver meshes to account for defects (gaps)
    - Thickness modification (soft tooling)
    - Fiber volume fraction (hard tooling)
    - Fiber orientation
  - Export of mapped results
    - Thickness: Abaqus only
    - Fiber volume fraction and fiber orientation: all FEA

 Copyright © 2017 MSC Software Belgium SA

- **Air gaps mapping from toolpath files**
    - Identification of local air gaps present in a toolpath on a receiving mesh
    - Export of element set corresponding to mapped gaps location
        - Available for Abaqus, ANSYS, LS-Dyna, Marc, Pam-Crash and Radioss

- **Support of degenerated SOL186 elements (ANSYS) for receiving mesh**

 Copyright © 2017 MSC Software Belgium SA



back to top

New Capabilities

- **CAE maintenance: supported version update**
  - Abaqus: 6.13-4, 6.14-1, 2016, 2017
  - ANSYS, 17, 17.2, 18
  - LS-Dyna, 7.1.2, 8.1, 9.0.1, 9.1
  - Marc: 2015, 2016
  - Nastran SOL1XX: 2016 or older, 2016.1, 2017.0, 2018.0
  - Optistruct: V13, V14
  - Pam-Crash: 2014, 2015, 2016
  - PERMAS: 16
  - Samcef: V16, V17
  - nCode: 12, 13

- **Initial stresses extension**
  - Now supported with the Hybrid solution
  - Extended support of FEA software
    - LS-Dyna
    - Marc

- **Weld line strength**
  - Definition of a strength degradation factor when using a weld line mapped file in the manufacturing data

- **Strain rate filtering**
  - New parameter to filter spurious oscillations of strain rate values during strain rate dependent FEA runs
  - Available with the Hybrid solution only
  - Applicable to failure models using a (V-)EVP material model

 Copyright © 2017 MSC Software Belgium SA

- **Stiffness reduction extension**
  - Revised formulation to remove time step sensitivity
  - Control on linear softening behavior
    - Definition of equivalent strain from failure initiation to final stiffness reduction
  - Available for
    - Implicit & explicit FEA
    - Solid & shell elements

- **Fused Filament Fabrication failure modeling**
  - Available for unfilled polymer materials
  - Available with the Hybrid solution

- **Support of encrypted files in ACT**
  - Encrypted material models now supported via direct assignment method

- **Time step computation in LS-DYNA/Explicit**
  - Optimized time step computation avoiding possible usage of mass scaling

- **Improved stiffness matrix computation in contact and boundary conditions in LS-DYNA/Explicit and Implicit**

Bug Fix

- **Reading of orientation file during FEA run**
  - Previously erroneous behavior: when using an orientation file which does not contain information for all integration points and using the Hybrid solution (using the default keyword Hybrid_minimize_memory = on), orientation data read for integration points beyond first integration point could be erroneous
  - Fix: orientation file data are now read correctly for any integration point even if orientation file does not contain data for each integration point

 Copyright © 2017 MSC Software Belgium SA

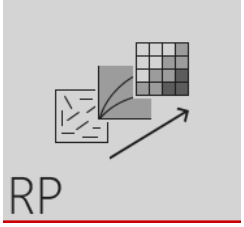
Notice

- **Digi2marc libraries are now directly available from the Digimat installer. No linking operation is required anymore**

- **Fluent interface is now available on-request**
  - Users should contact support@e-xstream.com to obtain the installer

- **Virtual.lab interface maintenance is dropped**
  - Users willing to access the Virtual.lab interface are advised to use Digimat 2017.1 or previous versions

 Copyright © 2017 MSC Software Belgium SA



back to top

New Capabilities

- **New user interface**
  - New look and feel
  - Revised workflow
    - Structural model / Digimat material / Manufacturing data / Solution settings
    - User guidance from component definition
      - Manufacturing data type
      - Material type

- **Extended support of molding manufacturing data**
  - Molding
    - Weld line data (SFRP/LFRP)
    - Fiber length distribution (LFRP)
    - Fiber volume fraction distribution (LFRP)
    - Residual stresses (SFRP/LFRP)

- **Support of additive manufacturing**
  - FFF
    - Material: unfilled polymer
      - From Digimat-MX
      - From file
    - Performance (Hybrid solution only)
      - Linear stiffness
      - Elastoplasticity
      - Elastoplasticity + failure
    - Manufacturing data
      - Toolpath (gcode)
      - Residual stresses

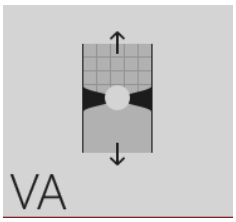
 Copyright © 2017 MSC Software Belgium SA

- FDM
  - Material: unfilled polymer
    - From Digimat-MX (Stratasys materials only)
    - From file (Stratasys materials only)
  - Performance (Hybrid solution only)
    - Linear stiffness
    - Elastoplasticity
    - Elastoplasticity + failure
  - Manufacturing data
    - Toolpath (Insight)
    - Residual stresses
- SLS
  - Material: unfilled polymer, bead reinforced polymer
    - From Digimat-MX
    - From file
  - Performance (Hybrid solution only)
    - Linear stiffness
    - Elastoplasticity
    - Elastoplasticity + failure
  - Manufacturing data
    - Global printing direction definition
    - Residual stresses

- **Extension of linear solution**
  - Abaqus now available on top of Nastran Sol1XX, Optistruct and PERMAS
  - Support of thermoelasticity

- **Control of number of material cards**
  - New linear template in Solution settings to control maximum number of material cards: reduction level

 Copyright © 2017 MSC Software Belgium SA



back to top

New Capabilities

- **PFA formulation enhancement for Unidirectional materials**
  - Available for filled hole and bearing tests

- **User defined material model**
  - Custom material model library to be built by user (full procedure described in Digimat documentation)
  - Definition of input parameters and outputs results in Digimat-VA user interface
  - Applicable to variability scenarios

- **First ply failure material model**
  - Available for Unidirectional composites
  - Based on Tsai-Hill 3D Transversely Isotropic failure indicator
  - Dedicated post-processing
    - Failure indicator output
    - Critical ply identification
    - Driving failure mode output

- **Additional process-related variability**
  - Ply misalignment (angle standard deviation definition)
    - Aligned plies
    - Non-aligned plies

Notice

The enhanced PFA formulation for UD in Digimat-VA 2018.0 can induce small results variations compared to previous Digimat versions, especially when using soft layups.

 Copyright © 2017 MSC Software Belgium SA



back to top

New capabilities

- **New FDM manufacturing type**
  - Provides access to Stratasys applications
    - Fortus 900mc printer
    - ULTEM 9085 material (available on-request)

- **Support failure modeling (FFF/FDM)**
  - Visualization of support location
  - Definition of interface strength in Material model definition
  - Definition of failure modeling approach
    - Failure index
    - Decohesion
  - Output of failure index value in Results

- **Chamber temperature definition (FFF/FDM/SLS)**
  - Enhanced definition of chamber temperature
    - Constant
    - Variable
  - Variable temperature definition via two interpolation models
    - Linear
    - Exponential
  - Inherent strain computation based on extrema chamber temperatures
  - Visualization of part temperature in results

- **Data management**
  - Support of encrypted material models for Digimat-AM
  - Inherent strain management
    - Can now be saved in Digimat-MX
      - Characterized via user-defined comments
    - Can now be loaded from Digimat-MX

 Copyright © 2017 MSC Software Belgium SA

- **Anchor pin definition for warpage minimization (FFF/FDM)**
    - In Manufacturing step, definition of anchor pin location and diameter

 Copyright © 2017 MSC Software Belgium SA

 Copyright © 2017 MSC Software Belgium SA



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

The e-Xstream and eXdigimat logos, e-Xstream engineering, eX, eXdigimat and Digimat are registered trademarks or trademarks of MSC Software Belgium SA. All other brand, product, feature names or trademarks are the property of their respective owners.

e-Xstream engineering is a division of MSC Software Belgium SA.

 Copyright © 2017 MSC Software Belgium SA