JSOL CORPORATION

NTT DATA Global IT Innovator

e-Xstream ENGINEERING

MSC Software Company

Pedestrian Safety & Frontal Car Crash

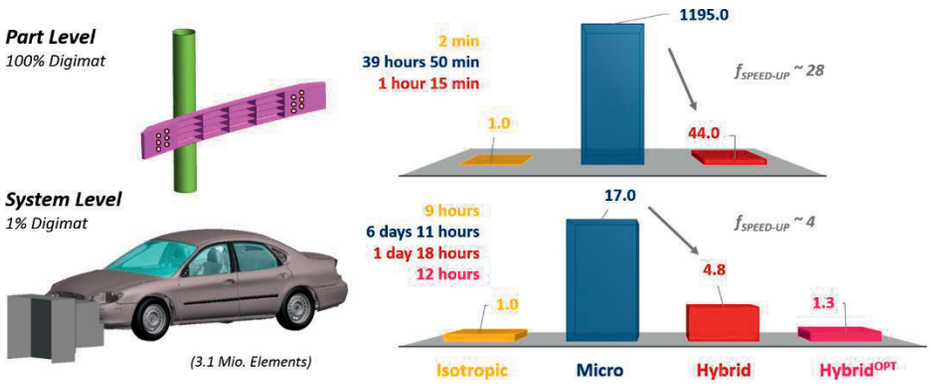
PARTNER: JSOL Corporation

- Committed to delivering comprehensive CAE solutions and strategic consulting focusing on digital engineering
- Largest LS-DYNA reseller in Japan
- Well known for adopting and using cutting edge technologies

CHALLENGES

- To accurately describe stiffness & failure of short fiber reinforced plastics
- To use coupled analyses in the simulation environment of the automotive industry
  - Applicability of the method from the part up to the system level
  - Usage of explicit solvers, dynamic scenarios including failure
  - Running system level analyses overnight (!)

APPLICATION OF THE HYBRID SOLUTION TECHNOLOGY IN AN INDUSTRIAL DESIGN ENVIRONMENT



DIGIMAT SOLUTION

- Elasto(visco)plastic modelling of SFRP including failure
- Hybrid solution run via the Digimat-CAE/LS-DYNA interface
- Part level: lower leg impact, 100% Digimat material in analysis
  - Clever choice of time step, mass scaling & parallelization
- System level: front car crash, approx. 1% Digimat material in analysis
  - Clever choice of domain decomposition & parallelization

RESULTS

- Part level – lower leg impact
  - Analysis stably runs within 1 hour 15 min *Digimat 4.4.1*
- System level – front car crash
  - Analysis stably runs within 12 hours *32 cores, Digimat 4.4.1*
  - Analysis can also be run within 8 hours *64 cores, Digimat 4.3.1*

MATERIALS
Short Fiber Reinforced Plastics

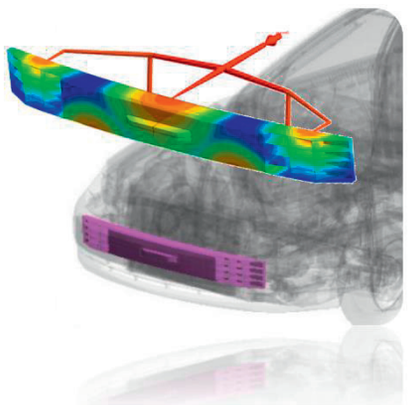
PERFORMANCES
Nonlinear Stiffness & Failure

DIGIMAT
Digimat-MF, Digimat-MX, Digimat-CAE, Digimat-MAP

CAE TECHNOLOGY
LS-DYNA, Moldex3D

INDUSTRY
Automotive

APPLICATION
Lower Leg Impact
Front Crash



Injection molded bumper beam, reinforced by short glass fibers.

"One of the biggest challenges for coupled analyses using explicit solvers is to apply the method in real life industrial design procedures. This includes lifting the method to the system level of simulation.
Based on the Hybrid solution technology multi-scale analyses are now available with sufficient performance to become an every-day tool for designing fiber reinforced parts."

Noriyo Ichinose, Sales engineer, JSOL Corporation, Japan

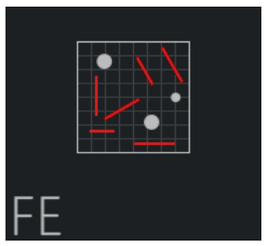
www.e-Xstream.com

Digimat

The nonlinear multi-scale material & structure modeling platform

Digimat material modeling platform means developing innovative, optimized and cost-effective products. As a unique nonlinear multi-scale material and structure modeling platform, Digimat offers:

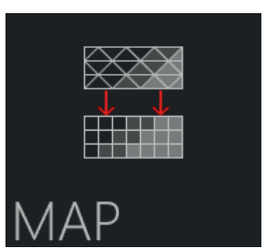
Digimat MF: Mean-Field homogenization software used to predict the nonlinear behavior of multi-phase materials.



Digimat FE: Finite Element based homogenization software used to model the nonlinear behavior of Representative Volume Elements (RVE) of material microstructures.

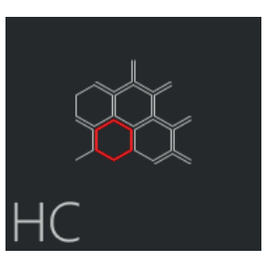
Digimat MX: Material eXchange platform used to prepare, store, retrieve and securely exchange Digimat material models between material suppliers and end-users**.**

Digimat CAE: Digimat linear and nonlinear interfaces to major processing and structural FEA software to enable multi-scale analyses of composite structures.



Digimat MAP: Shell & 3D mapping software used to transfer fiber orientation, residual stresses and temperatures between dissimilar processing and structural meshes.

Digimat RP: Easy and efficient solution for the design of fiber reinforced plastic parts.



Digimat HC: Easy and efficient solution for the design of honeycomb sandwich panels.

e-Xstream engineering

MSC Software Company

The material modeling company

e-Xstream engineering is a provider of simulation software & engineering services, 100% focused on advanced material modeling. e-Xstream was founded in 2003 in Belgium and Luxembourg. e-Xstream is an MSC Software company since September 2012 with more than 1100 associates working from over 20 offices around the world.

e-Xstream engineering develops and commercializes Digimat – the nonlinear multi-scale material and structure modeling platform that fastens the development of optimal composite materials and parts.

Digimat customers are material experts and structural engineers who accurately predict the behavior of multi-phase composite materials and structures. Digimat is used by all major material suppliers and users across all industries (Automotive, Aerospace, Electric & Electronics, Leisure, Defense ...).

With this important customer base worldwide, e-Xstream combines deep expertise in material modeling and numerical simulations with the business understanding of the large variety of materials used across all industries.

www.e-Xstream.com