Force response of a sun roof bearing

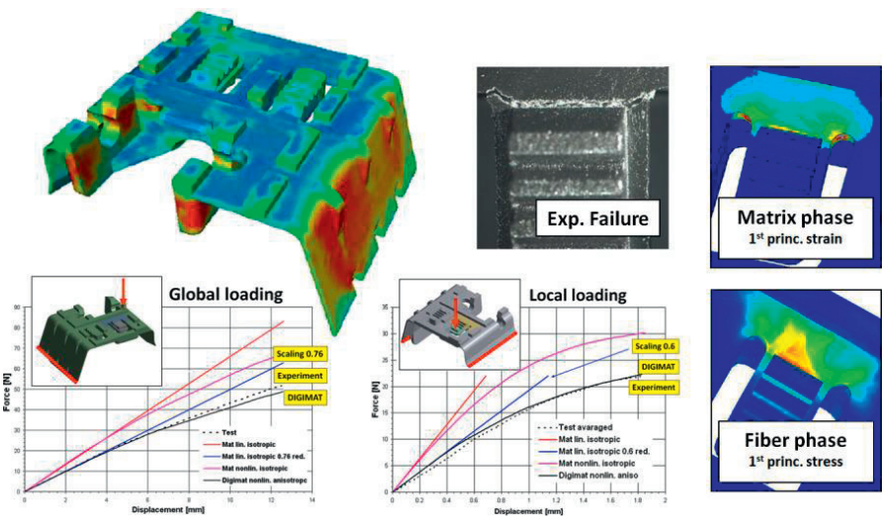
CUSTOMER: Ticona GmbH

- Solutions-driven company and producer of high performance plastics
- Close support of customers during their engineering design process in a large number of key markets
- Contributor to the Digimat-MX material suppliers' database

CHALLENGE

- To correctly model fiber reinforced plastic parts
- To have quantitative and predictive results from FEA
- To use a unique material description valid for all kind of different load cases

WHAT KIND OF MATERIAL MODELS CAN FULFILL THE DEMANDS?



DIGIMAT SOLUTION

- Calibration of an elastoplastic micromechanical DIGIMAT model based on dumbbells from a plate cut 0° and 90° with respect to highly oriented fibers
- Setup of two different load cases (global & local) with different isotropic approaches and via DIGIMAT multi-scale modeling

RESULTS

- With the scaling approach two different factors have to be applied to match the experimental force displacement curve of the global and local load case
- Only the micromechanical DIGIMAT model describes correctly both load cases based on one unique material model taking into account fiber orientations predicted by injection molding simulation
- In good correlation with experimental failure DIGIMAT per-phase results point out the critical location in the part

MATERIALS
Reinforced plastics

PERFORMANCES
Stiffness, failure

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

CAE TECHNOLOGY
ANSYS, Moldflow

INDUSTRY
Automotive

APPLICATION
Sun roof bearing

"Ticona's intent is to provide solutions to our customers. Speed and quality of CAE predictions are key factors when we work on new components. Customers expect working solutions based on detailed structural response predictions and optimized mold design. From the results of our practical tests, the use of DIGIMAT to link Moldflow with Ansys structural analysis proved to be a very good way to fulfill these customer needs."

Ulrich Mohr-Matuscheck, Leader Design CAE, Ticona GmbH

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.

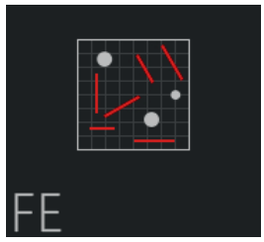
Digimat MX: Material eXchange platform used to prepare, store, retrieve and securely exchange Digimat material models between material suppliers and end-users**.**

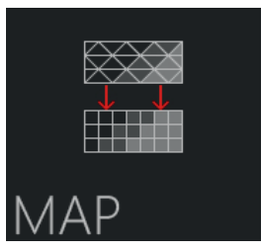
Digimat CAE: Digimat linear and nonlinear interfaces to major processing and structural FEA software to enable multi-scale analyses of composite structures.

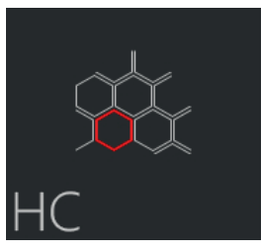
Digimat MAP: Shell & 3D mapping software used to transfer fiber orientation, residual stresses and temperatures between dissimilar processing and structural meshes.

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.

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