

Airbag Deployment – Analysis of the Housing Strength

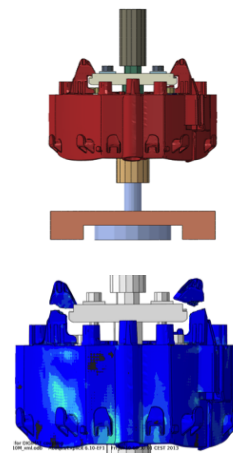
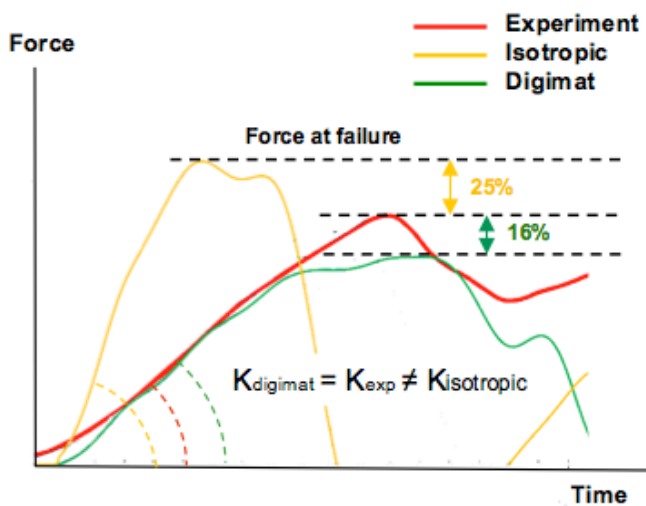
CUSTOMER → Autoliv

- Global leader in automotive safety technology
- 80 sites in 29 countries, of which 8 R&D sites
- Lightweight design + safety = drivers for the market

CHALLENGES

- Design of airbag housing at deployment
- Moves security margin from 30% to 10%
 - Optimize the design and save material purchase
 - Reduce engineering time spent in iterations between development and prototyping
 - Save budget for prototype production and testing

Excellent Correlation with Experiments



Failure at deployment



Exp. Failure at deployment

DIGIMAT SOLUTION

- Micromechanical anisotropic modeling of DSM PA6 GF40 (AKULON K224 PG8)
- Elasto-viscoplasticity + failure
- Coupled simulation taking into account fiber orientation prediction from a simulation of the injection manufacturing process

BENEFITS

- Good correlation with experiment
 - Initial stiffness
 - Deployment strength & failure location
- Improved accuracy reduces security margin
 - Leads to light-weighting / save material (mass)
 - No compromise on safety
- Estimated ROI: 100k € saved per project

MATERIALS

Short Fiber Reinforced Plastics
PA6 GF40

PERFORMANCES

Failure prediction under
dynamic load

DIGIMAT

Digimat-MX, Digimat-FE,
Digimat-CAE, Digimat-MAP

CAE TECHNOLOGY

Abaqus, Moldflow, Moldex

INDUSTRY

Automotive

“Compared to the standard isotropic material, Digimat helped to improve the failure mode of an airbag housing during a deployment, and to almost predict the failure force.”

- Charles Fouret, CAE Team Leader, Autoliv

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.



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

