

## Stiffness of a bracket in reinforced PBT

### CUSTOMER: SCHNEIDER ELECTRIC

- Global specialist in energy management offering integrated solutions for safe, efficient and reliable energy
- Continuously exploring new technologies, developing new products and serving new markets

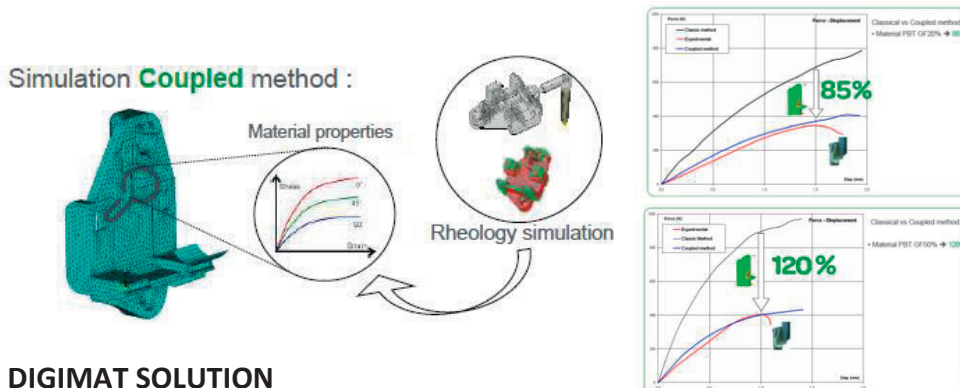
### CUSTOMER: DUPONT

- Provider of wide range of innovative products and services for markets including electronics, communications, safety and protection, ...
- DuPont uses DIGIMAT to support their customers in designing innovative composites

### CHALLENGE

- Predict structural response of a glass fiber filled PBT polymer bracket
- Accurately design and optimize electrical components existing geometry

## HOW TO TAKE INTO ACCOUNT THE INFLUENCE OF PROCESSING IN STIFFNESS PREDICTION?



### DIGIMAT SOLUTION

- Reverse engineering of an elasto-plastic DIGIMAT material model
- Computation of the nonlinear stiffness based on fiber orientation prediction performed with Moldflow
- Comparison with experimental stiffness for two different composite materials developed by DuPont:
  - 20% glass fiber reinforced PBT polymer, (material 1)
  - 50% glass fiber reinforced PBT polymer, (material 2)
- Material damage behavior is not modeled

### RESULTS

- Stiffness at break computed with standard elastoplastic materials leads to **85% error** for part in material 1 and to **120% error** for part in material 2.
- Stiffness at break computed with elastoplastic DIGIMAT materials leads to **5% error** for part in material 1 and to **2.5% error** for part in material 2.
- **Process design can be trustfully optimized with DIGIMAT to improve part performances at better cost.**

### MATERIALS

Short fiber reinforced plastics

### PERFORMANCES

Stiffness at break

### DIGIMAT

Digmat-MF, Digmat-CAE, Digmat-MAP, Digmat-MX

### CAE TECHNOLOGY

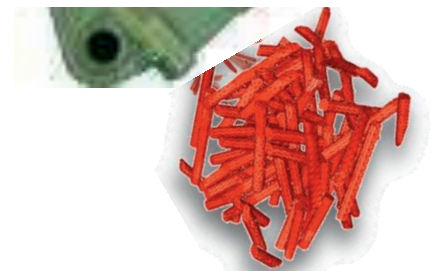
Ansys, Moldflow

### INDUSTRY

Electrical goods

### APPLICATION

Design of a GF reinforced bracket



Glass fiber reinforced bracket (50% GF).

“...From REACH legislation to unexpected fluctuations in raw material price levels, our products are more than ever challenged, in this context DIGIMAT offers the perfect combination of material modeling platform to optimize the performance of our reinforced thermoplastic components and DIGIMAT has demonstrated its ability to provide robust and accurate prediction of our materials behavior.”

**M. Oubahmane**  
Innovation & Technology  
Specialist  
Schneider Electric

## 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

MSC Software 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](http://www.e-Xstream.com)

