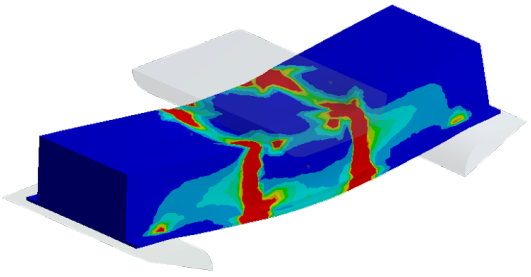
Case Study: e-Xstream engineering

Identifying the best design configuration with Digimat-RP/Moldex3D

Summary

Reinforced plastic materials show a highly complex mechanical behavior strongly dependent on molding process and consequently on fibers orientation. Generally where fibers are highly concentrated load increases and leads easily to crash. Modelling correctly the crash area implies getting the right fibers orientation estimation, and the desired mechanical behavior. This requires a reliable and efficient predictability of mechanical performances based on the simulation of the molding process. Testing different configurations in order to have the best design requires long time and work days wasted, extending the design process and slowing down structural coupled analysis.

Digimat-RP/Moldex3D allows to decrease analysis time and speed up the whole design process, with fast runs and easy access to results ready to submit to structural analysis. Structural engineers can now manage, monitor and test plastic parts injection by themselves and take the best decision to have the correct crash performance.



Crash box analysis simulation

"Digimat-RP/Moldex 3D helps to overcome these challenges to accelerate early design of plastic parts and provides a quick and easy access to fiber orientation to structural engineers." – Dr. Roger Assaker, CEO, e-Xstream engineering"

- Dr Roger Assaker, CEO, e-Xstream engineering

Challenge

- Easy set up of the injection process for different design configurations modifying minimal input parameters, like injection gates number;
- Identifying critical spots depending on fibers orientation in order to have a preliminary idea of where crash will happens for all the configurations;
- Access to simulation results and directly submit structural analysis to compare all the configurations crash results;
- Taking the right design decision in short time for the best configuration who correctly capture the mechanical behavior of the box.

Solution

- Testing three injection design configurations increasing the number of injection gates;
- Comparing the resulting orientations of the fibers who determine accumulated load and influence local failure;
- Choosing a better configuration with a new lateral injection gate and a stiffer design with no critical spot influencing failure zone.

Results/Benefits

- Cycle time reduction increasing injection gates number analysis time 45 minutes of CPU for each configuration;
- Optimizing choice of the most efficient design configuration to give to structural analysis;
- Excellent and accurate prediction of fibers orientation determining the right mechanical response;
- Direct and easy monitoring interface into the work environment.

Key Highlights:

Digimat:
Digimat-RP/Moldex3D

CAE Technology:
Abaqus

Material:
Reinforced Plastic

Industry:
Automotive

Application:
Crash box

Performances:
Failure determination

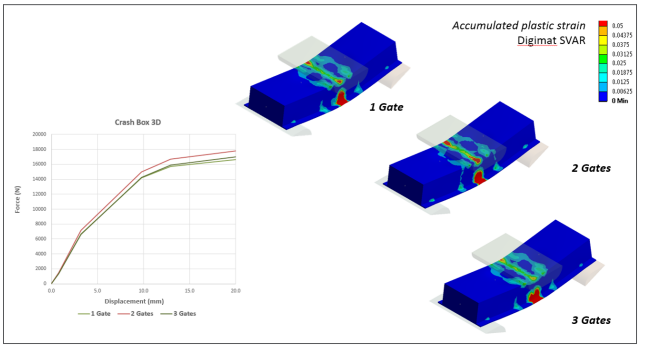


Figure 1: Accumulated Plastic strain and Crashbox response trend for incresing gates number

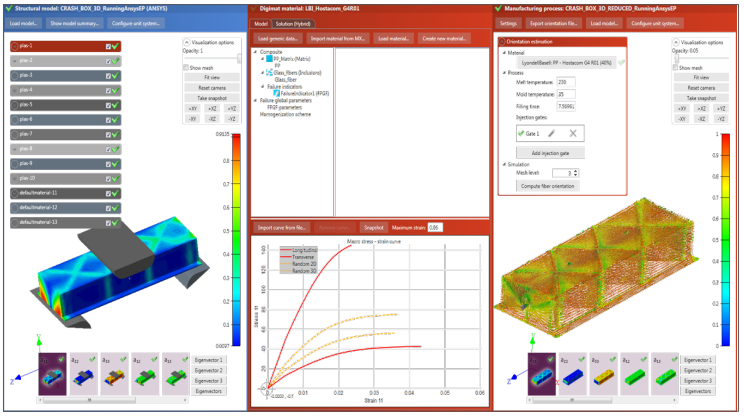


Figure 2: Analysis Assembly with a stiffer design

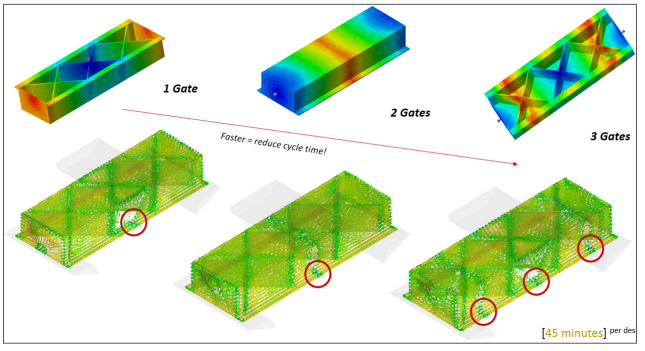


Figure 3: Critical spot vs. filling time

For more information on Digimat and for additional Case Studies, please visit www.e-Xstream.com

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