Challenge of the early virtual functional development phase of plastic parts in low-speed and pedestrian protection load cases

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Plastics in Vehicle

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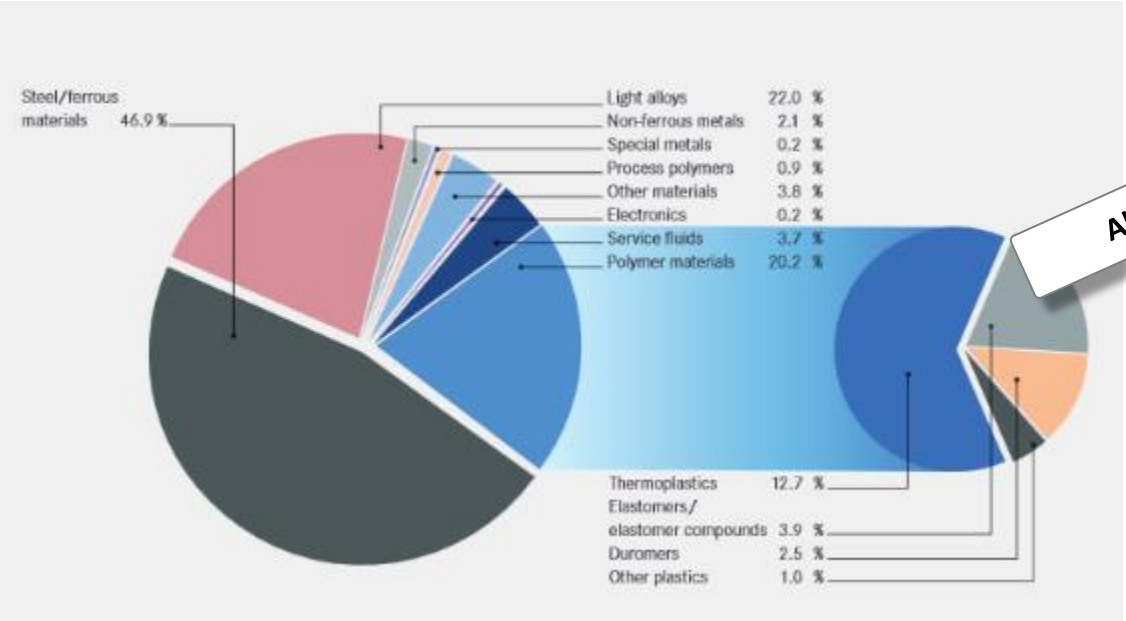
Plastics in Vehicle



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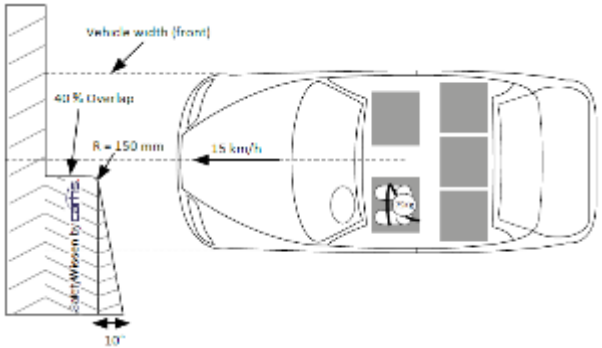
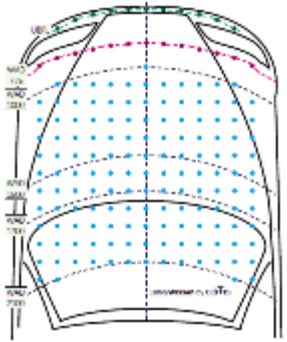
Test Procedures Vehicle Front and Interior

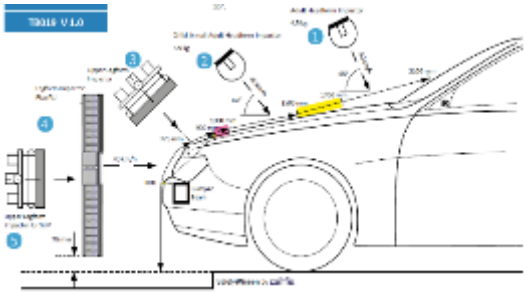
Lowspeed Structural Crash Test (Insurance Test)



Euro NCAP – Pedestrian Protection
Head and Leg Impact Grid



Pedestrian Protection Test Procedures NCAP



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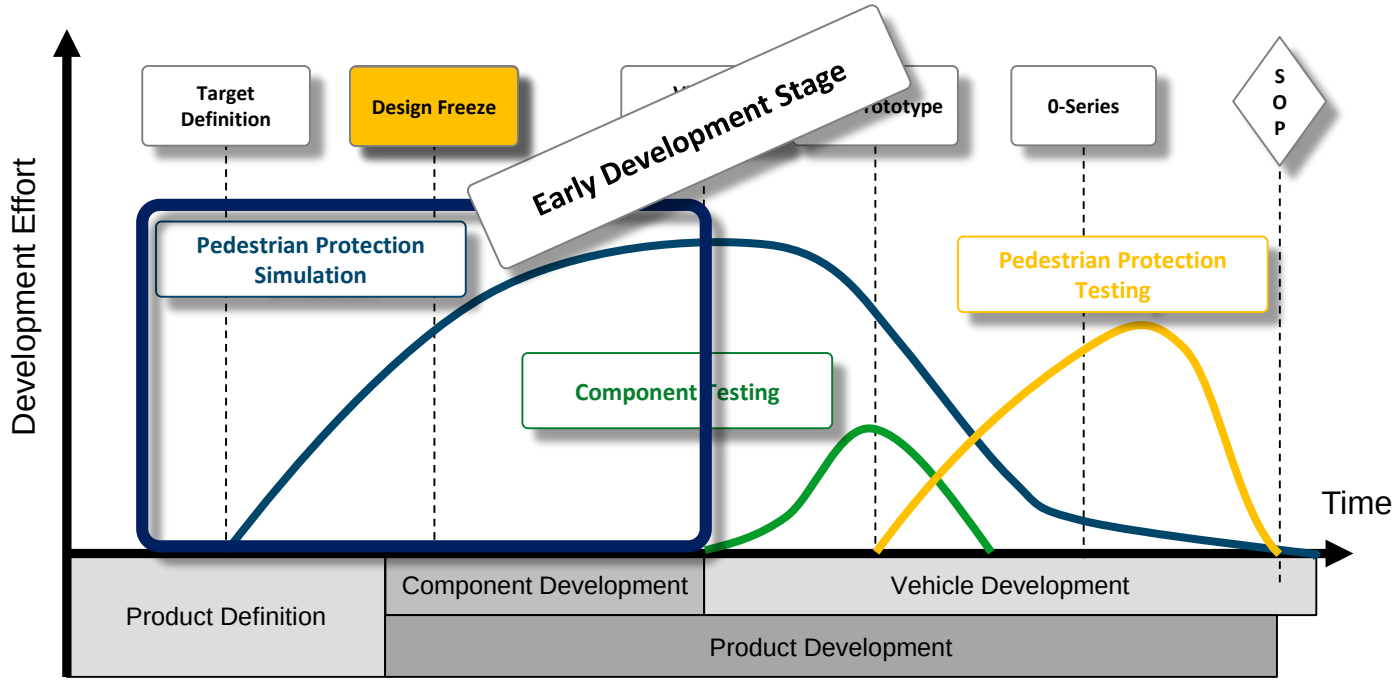
Development Process



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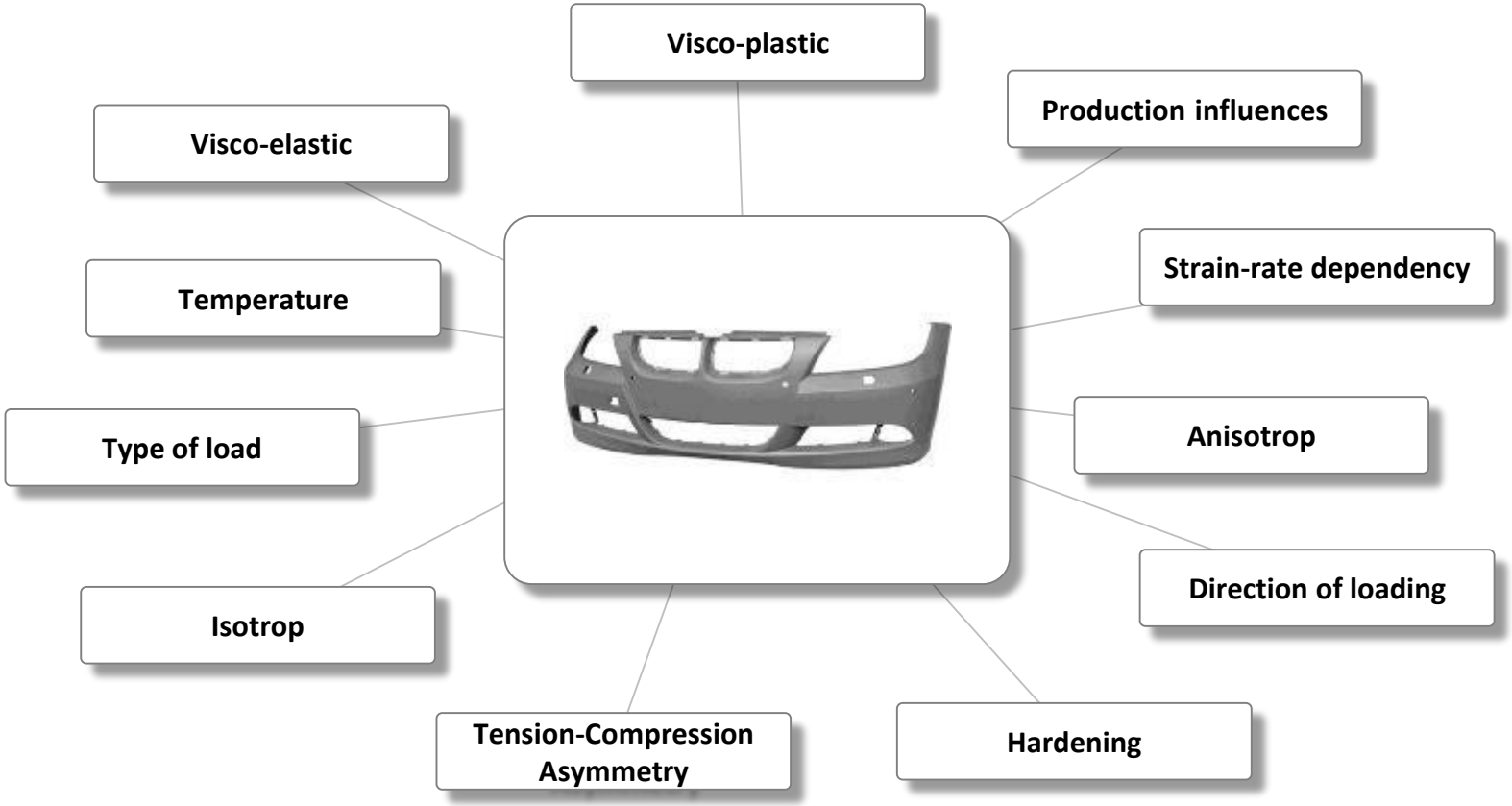
Plastics in Crash



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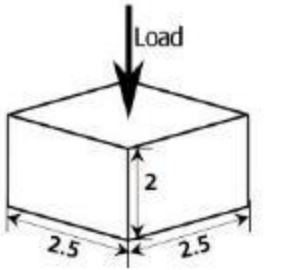
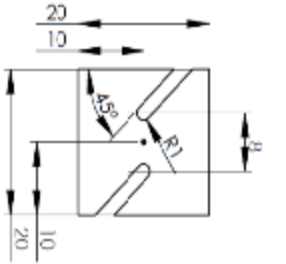
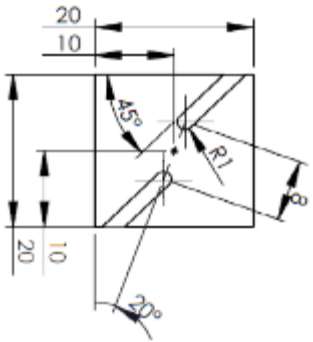
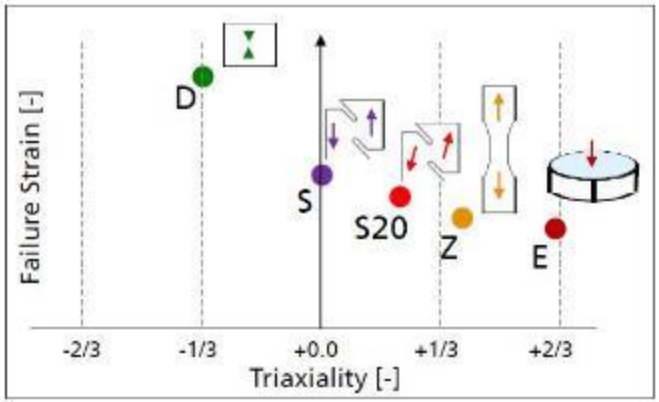
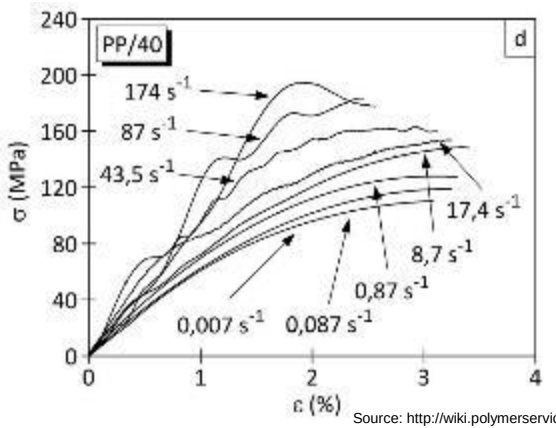
Classification of Experiments



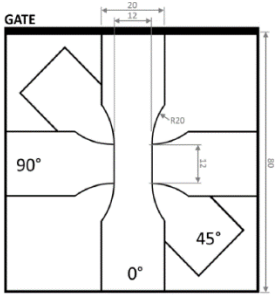


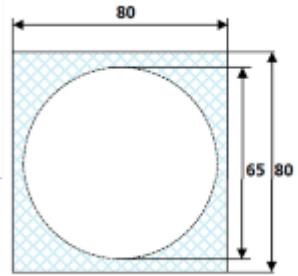


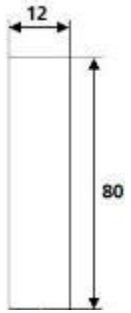




Source: http://wiki.polymerservice-merseburg.de







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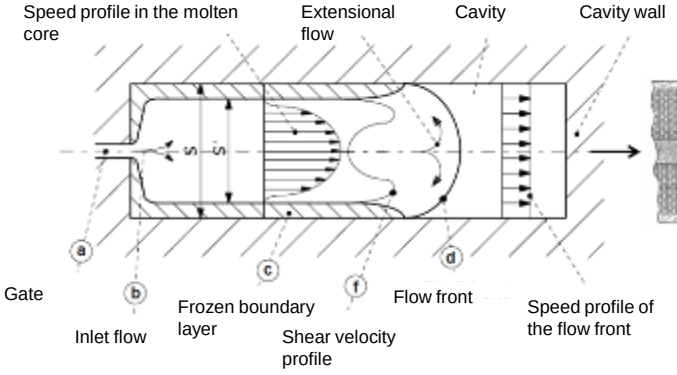
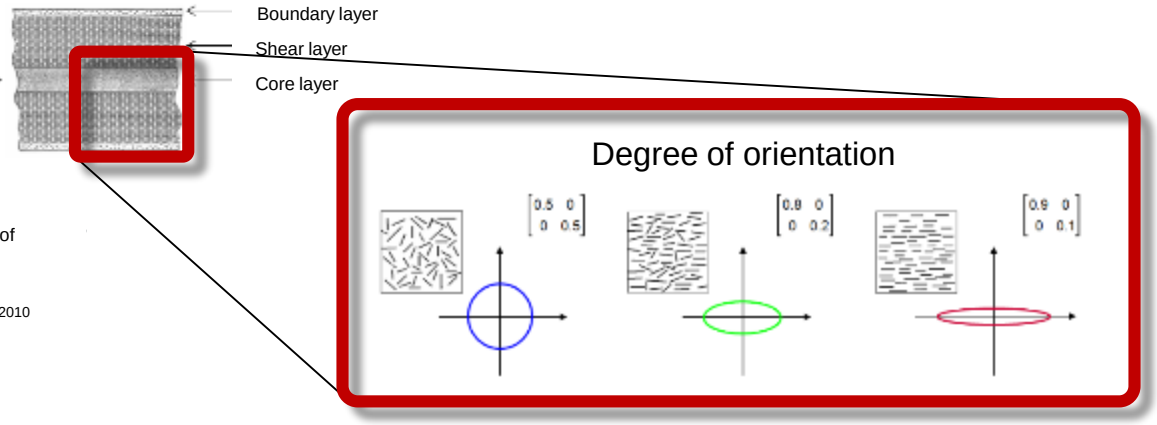
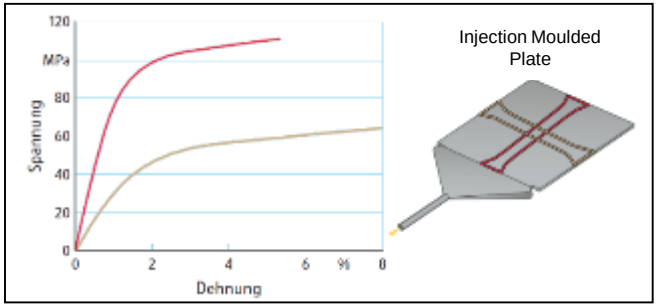
Injection Moulding Process Information



Source: Moldflow Schulungsunterlagen. 2010





Source: Glaser, S.: Integrated simulation of crash-loaded fibre-reinforced thermo-plastic parts. EuroPam 2008, Prag, 2008.

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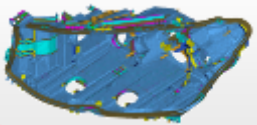
Simulation Method for Anisotropic Materials

FE-Mesh

FE-Mesh from internal process or from the supplier (development model)



?

No further information on process information's available

Process Simulations

Supplier Process Inf.

Supplier Process Informations from Process Simulations. (CadMould, Moldflow, …)

Additional Software for mapping the Process Informations on the FE-mesh needed

Supplier is selected

Geometry Interpretation

Process Interpretation

Definition Phase | Concept Phase | Pre Development | Series Development

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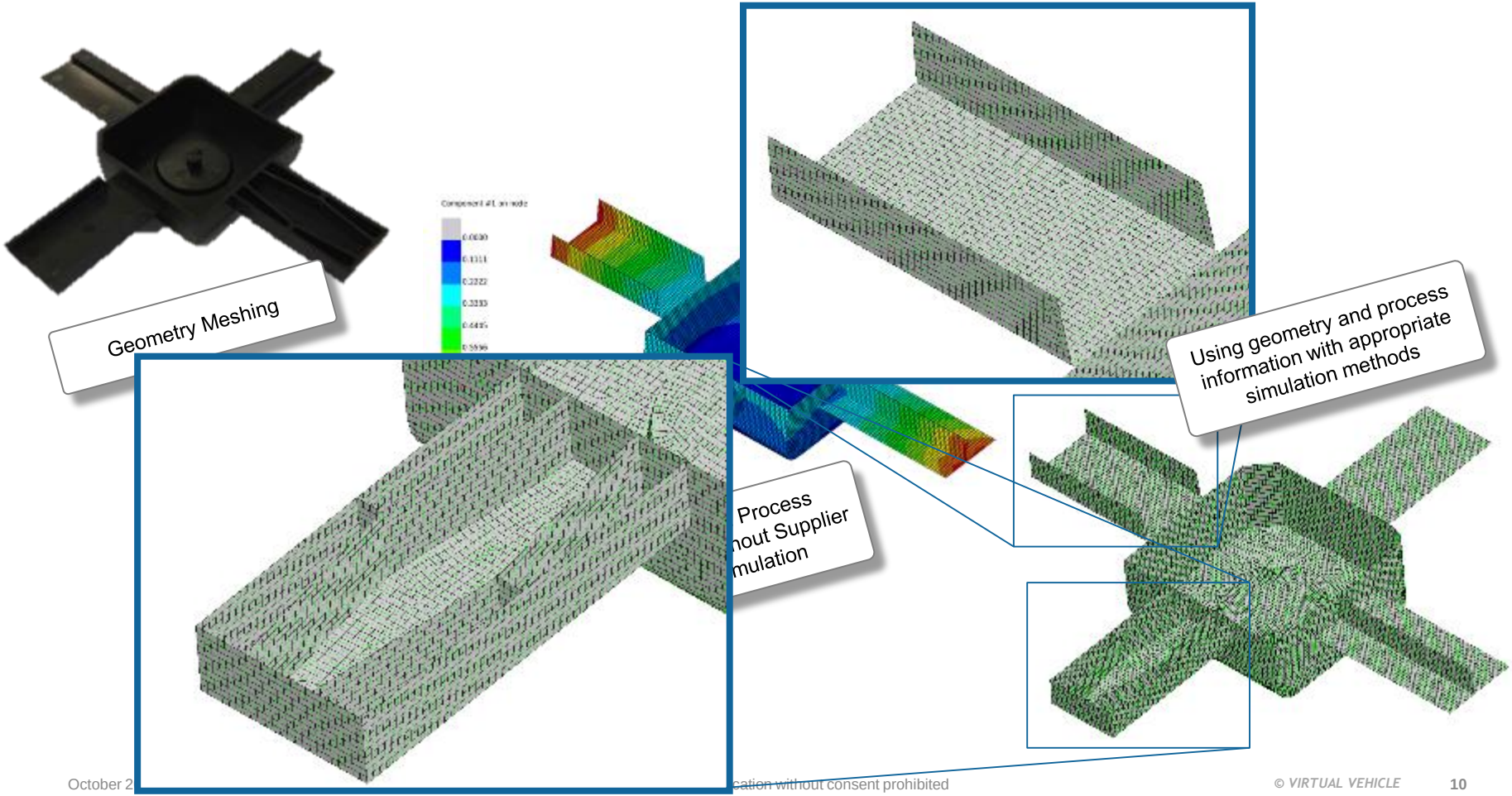
Process Information in Early Development Stage



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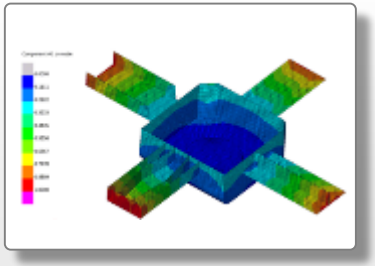
Process Information in Early Development Stage

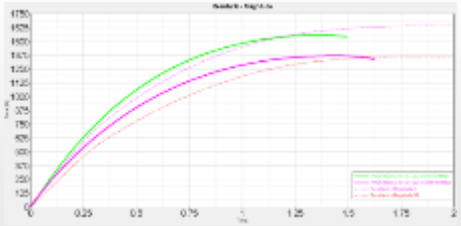
Process Information

Injection molding flow front simulation

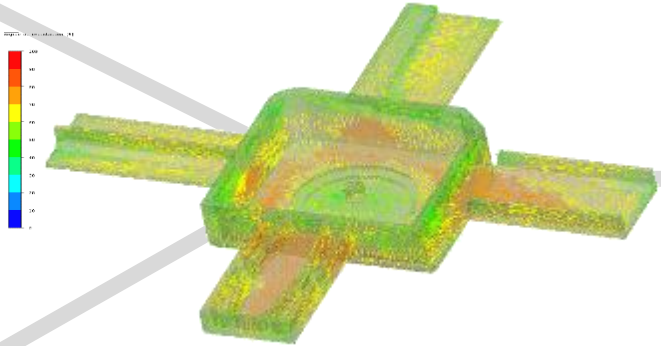


Material Information

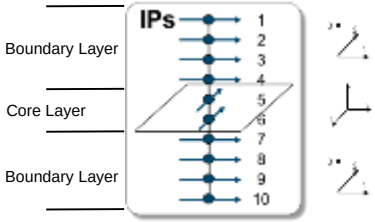
Anisotropic Materialcards



Combined in Development Model



Predefined Geometric Zones are detected and modified



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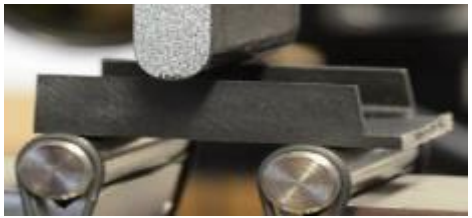
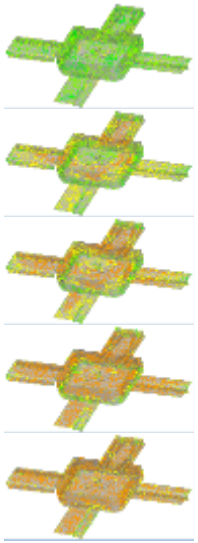
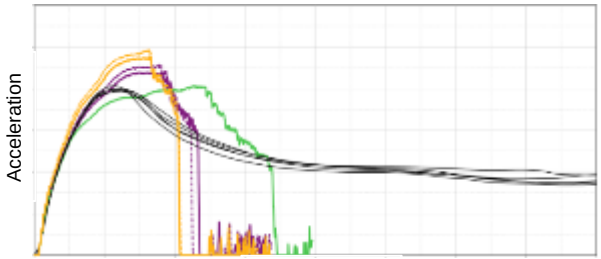
Modelling Geometry and Process Information

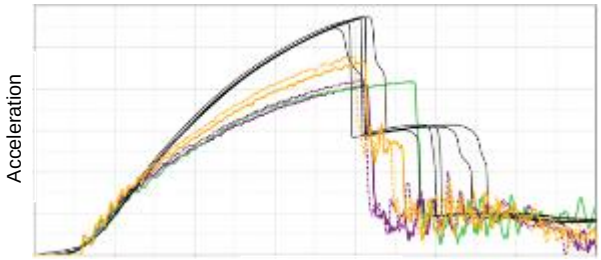
Test Configuration



Fibre Orientation







Standard Material Card
With Geometry Interpretation
With Geometry and Process Interpretation

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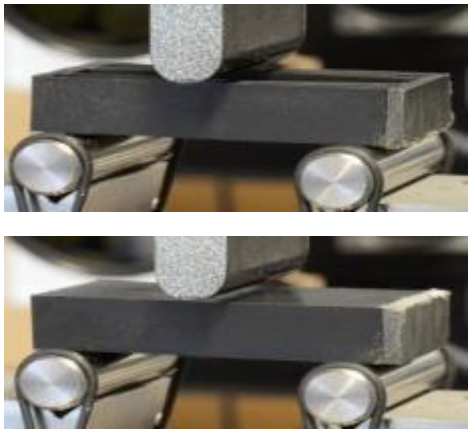
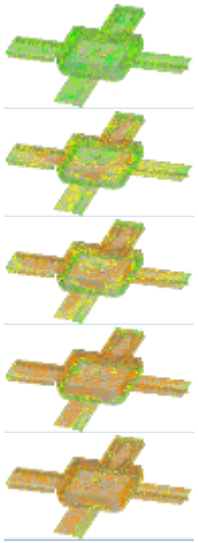
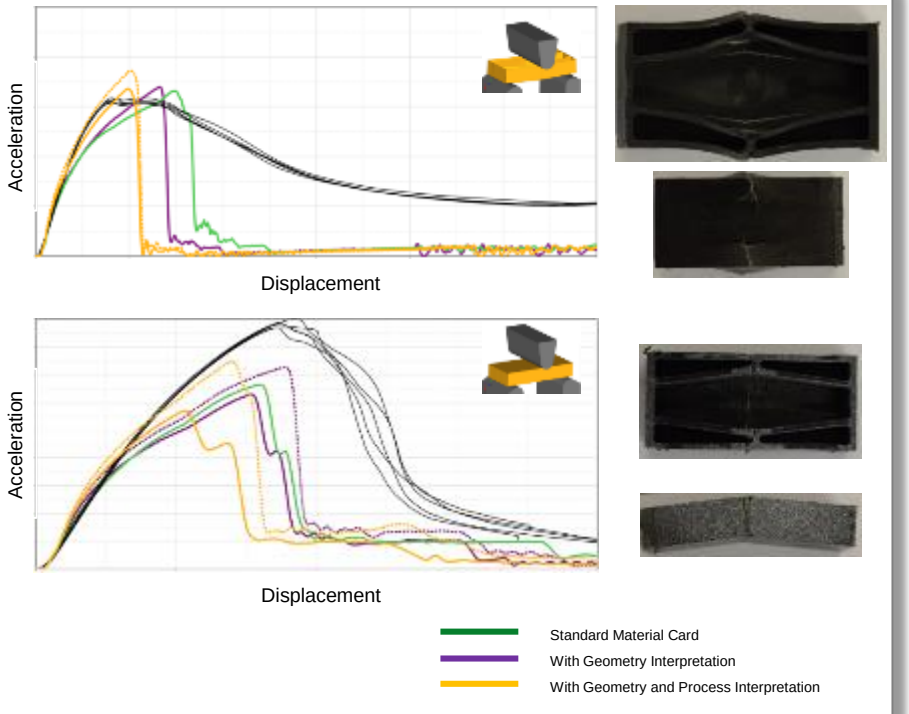
Modelling Geometry and Process Information

Test Configuration



Fibre Orientation





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Conclusion

- Development Tool for the Early Stage
- No substitute for injection molding simulation
- As a supplement to the use of anisotropic material cards
- To take into account production-related properties at an early stage of development

Predictive simulation methods lead to **predictive Pedestrian and Occupant Safety** Simulations

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VIRTUAL VEHICLE DIGITAL MOBILITY

THANK YOU

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