International VDI Conference

Simulation in Automotive Lightweight Engineering

April 25 – 26, 2018, Amsterdam, The Netherlands

• Simulation as an Enabler for Design and CAE driven Development
• How to create an integrated Simulation Process Chain
• Simulation, Modeling and Testing of Lightweight Materials
• Structural Simulation, Crash Simulation and Damage Modeling
• Optimization- and Verification-Strategies
• Simulation in Additive Manufacturing
+ Workshop „Digital Twin“
+ Panel Discussion
+ Visit of the MX3D Facility

Meet international experts from:

Keynotes by: Altair, Volvo Cars

An event organized by VDI Wissensforum GmbH

www.vdi-international.com/lightweightsimulation
Expected Participants according to Functions

- Project Lead/Project Director: 22%
- Head of Design and Simulation: 17%
- CAE Director: 17%
- Simulation and Modeling Expert: 33%
- Head of Advanced Development: 11%

Expected Participants according to Industries

- Academia, Research, Other: 10%
- Metal working and Plastics processing Industry: 25%
- Tier 1 & Tier 2 Supplier: 20%
- Software Provider / Virtual Prototyping: 25%
- OEMs: 5%
I. Simulation as an Enabler for Design

10:50 Simulation Driven Design – Design the Difference
- Why simulation driven design?
- Key requirements and enablers for simulation driven design
- Examples of simulation driven design processes
- Project examples
- Vision of future simulation driven design
Dr.-Ing. Lars Fredriksson, VP-Simulation Driven Innovation, Altair Engineering GmbH, Germany

11:30 CAE driven Development – Vehicle Applications and future Challenges
- Shift of CAE applications for early development phases in the vehicle industry
- High demands on the development of CAE methods and tools to drive conceptual design
- Key application areas: Topology, thickness- and material-optimization and performance balancing
- „Optimization Culture Arena“ to support a CAE driven development as well as the development of guidelines and methods for optimization
- Cross technical network for knowledge sharing and optimization competence development
Harald Hasselblad, Ph.D., Senior Analysis Engineer, co-author: Andreas Carlsson, Analysis Engineer, both: Volvo Cars, Sweden

II. Virtual Testing of Lightweight Materials

15:20 Combining CAE Technology with new Material Developments to reduce Weight
- Combining thermally conductive polymers technology, flow simulation and thermal simulation to reduce weight
- Improvements in material technology allow to make thinner/lighter parts
- Usage of flow simulation and modal analysis to support this development
Jonathan Barclay, M.Sc., Global Leader Design and Simulation, Celanese Services UK Ltd.

15:50 Networking & coffee break

16:20 Virtual Testing based on statistically similar RVEs – Application to micro-heterogeneous Materials used in Lightweight automotive Engineering
- Simulation of multiphase steel and carbon fiber-reinforced materials
- Characterization of material properties in virtual laboratory
- Incorporation of different scales
- Improvement of simulation time
Prof. Dr.-Ing. habil. Daniel Balzani, Professor for Continuum Mechanics, Ruhr-Universität-Bochum, Germany, co-authors: Takashi Sasagawa, Associate Researcher and Dr. Masato Tanaka, Researcher, both: Toyota Central R&D Labs. Inc., Japan
16:50  Damage Modeling of fabric-fiber-reinforced Lightweight Components with thermoplastic Matrix
- Organic sheets: Layered composites in form of a twill weave impregnated by a thermoplastic polypropylene matrix
- Consideration of preferred directions introduced by reinforcement structures as predicted by drape simulation
- Mechanism-based damage formulations in the reinforcements and the thermoplastic matrix
- FEA Analysis of the model with the implicit finite element code Abaqus
Dr.-Ing. Martin Giersbeck, Vice President Plastics Engineering, Robert Bosch GmbH, co-authors: Dominik Naake, M.Sc., Ph.D. Student, Robert Bosch GmbH and KIT and Prof. Dr.-Ing. Frank Henning, Professor, KIT, all: Germany

17:20 Integrating big Material Data in the modern automotive Design Workflow
- Key challenges in finding reliable information about materials to drive best practice
- Keeping pace with the information integration requirements of the automotive industry
- Using material discovery tools to make insightful decisions: Lightweighting application example
- Importance of data management tools in optimizing activities in design and the supply chain
- Case studies from the automotive industry
Prof. Dr. Viktor Pocajt, CEO and Owner, Key to Metals AG, Switzerland

17:50 End of conference day one

Get-together
At the end of the first conference day we kindly invite you to use the relaxed and informal atmosphere for in-depth conversations with other participants and speakers.

III. Integrated Process Simulation

08:30 Continuous Process Simulation for Continuous Fiber Reinforced Composites
- Continuous CAE chain for automotive composite design
- Forming simulation of non-crimped fabrics and thermoplastic tapes
- Molding simulation for fast-curing resin injection
- Combined forming and molding simulation for wet compression molding
- Curing simulation and warpage prediction
Dr.-Ing. Luise Kärger, Deputy Head Lightweight Technology, KIT, co-author: Prof. Dr.-Ing. Frank Henning, Professor Lightweight Technology, KIT

09:00 An Introduction to isogeometric Design and Analysis
- Description of challenges isogeometric analysis addresses
- The importance of analysis-suitable geometry
- Introduction to U-splines
- Application to automotive problems
Prof. Michael Scott, Professor of Civil Engineering, Brigham Young University and Co-Founder Coreform LLC, USA

09:30 How End to End Simulation of new Materials and Multi-Material Assembly can be used in the Design and Verification of next Generation of lighter Vehicles
- Composite crash simulation
- Process and multi-material assembly simulation
- Influence of manufacturing on crash and mechanical performance prediction
- Material virtual characterization
- Multi-scale modeling
Alain Trameçon, M.Sc., Product Manager – Composites Structural Simulation, ESI Group, France, co-authors: Dr.-Ing. Sebastian Müller, Consulting & Development Engineer, ESI Software Germany GmbH and Dr. Patrick de Luca, Composites Solution COE Manager, ESI Group, France

10:00 Process & integrative Simulation for long Fiber reinforced composite Materials
- Process simulation
- Integrative simulation chain – Forwarding of process simulation results to structural simulation
- Long fiber reinforced plastics in thermoplastics and thermosets (GMT, SMC, LFT, BMC)
- Injection and compression molding
Christoph Kuhn, M.Sc., Research Project Manager, Volkswagen AG, co-author: Dr.-Ing. Olaf Täger, Fakultät Maschinenwesen, Technische Universität Dresden, both: Germany

10:30 Networking & coffee break
11:00  Process Simulation and Optimization for Additive Manufacturing of Lightweight Structures
- Definition of ideal build-up orientation
- Generation of optimized support structures based on simulation
- Compensation of residual distortions
Dr. rer. nat. Nils Keller, Managing Director and CEO, Additive Works GmbH, Germany

11:30  Automatic Model Refinement in Simulation of complex shaped Composite Products
- Modeling and simulation of the structural performance of shell-like structures and automatic model refinement
- Unidirectional fiber reinforced composite materials
- Automatic local adaption of the shell structure to a stacked-shell model connected with cohesive elements to incorporate damage initiation
- Multiscale modeling: Incorporation of local connecting element models into the global model
- Connection of plate structures and incorporation of local refinement in a bolted area

12:00  Lightweight Design based on tailored Design Techniques
- Target setting: From system performance to component specification
- Tailored design techniques
- Choosing the right lightweight strategy
- Speed-up validation times
Natalia Navarrete, Ph.D., Innovation Platform Coordinator – Advanced Research, Metalsa SA de CV, Mexico

12:30  NextGen Spaceframe 2.0: Bionics, Additive Manufacturing and Aluminium for flexible, high-end Lightweight Design
- Hybrid design with additive manufacturing in combination with aluminium extrusion profiles
- High-end lightweight design of a front vehicle structure
- Extremely flexible manufacturing on demand for a large number of vehicle derivatives
Daniel Schilder, B.Sc., CAE Hamburg, co-author: Dr. Martin Hillebrecht, Head of CC Lightweight Design, both: EDAG Engineering GmbH, Germany

14:00  Advances in the Prediction of Weld Line Strength Failures for Fiber filled Plastics
- Moldflow insight software analysis to determine weld surface locations and fiber orientation
- The interface to a more accurate structural simulation
- Fiber filled materials
Eric Henry, B.Sc., Senior Simulation Specialist, Autodesk Ltd. UK

14:30  Topology and Casting Optimization to develop Lightweight Components
- Topology optimization of casted components
- Modifying topology optimization setup with respect to casting
- Interpreting topology results and evaluating using cast simulation
Harald Hasselblad, Ph.D., Senior Analysis Engineer, Volvo Cars, Sweden

15:00  Simulation-based Optimisation for Crash – Innovative and robust Design Creation
- Optimisation methods for simulation
- Design of experiments for cause-and-effect analysis
- Multidisciplinary optimisation (MDO)
- Systematic optimisation for cost, quality and performance
- Design for robust performance
Dr. Simone Gemkow, Structural Integration Lead Engineer, Jaguar Land Rover Limited, UK

15:30  Closing the Simulation Process Chain from Producibility to Serviceability: An Overview
- Overview of CAE processes in sheet metal, polymers and cast materials
- Constitutive models in process and performance simulation
- Challenges in data transfer across different applications
Dr.-Ing. Andre Haufe, Manager Process Simulation, co-author: Dipl.-Ing. Christian Liebold, Software Developer, both: DYNAmore GmbH, Germany

16:00  Conference Chair’s closing Remarks

16:15  End of conference
CONTENT
The digital twin offers companies great chances for better products and new business models. It is a 1:1 digital data representation of a physical product or process over its whole lifecycle. The roots of this concept rely on the Internet of Things which enables to collect realtime data from products. The digital twin will be synchronized with sensor information from the corresponding physical twin. Based on these insights, for example from predictive analytics, improvements in product development, production and service can be realized.

This workshop provides an overview of the concept for the digital twin and its practical relevance especially for product engineering and simulation. Practical use cases show the opportunities of the digital twin in an exemplary manner. Product engineers are able to learn from the product use in the field. It is possible to gather information about performance issues or if a product is used in a different way than expected.

The main part of the workshop consists of breakout sessions in which important topics will be elaborated followed by moderated discussions. Participants are invited to actively contribute during the breakouts.

Introduction
- The idea behind the digital twin
- Demonstration of use cases

Breakout Sessions – Planned topics include:
- Further identification of use cases
- Impediments of identified use cases
- Introduction of a digital twin to a company

Discussion and Conclusion
- Main findings of the workshop day
- Outlook into the future of digital twins

(Please note that the number of participants is limited. Registrations and individual parts and segments of the workshop are subject to confirmation)
You will find more hotels close to the venue at www.vdi-wissensforum.de/hrs

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Sandra Klack
Project Consultant
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Please submit your topic to:
Leonie Bohnstedt
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Conference venue
Novotel Amsterdam Schiphol Airport
Taurusavenue 12
2132 LS Hoofddorp, The Netherlands
Phone: +31 207219180
Email: H7060@accor.com
Website: http://www.novotel.com/de/hotel-7060-novotel-amsterdam-schiphol-airport/index.shtml

Hotel room reservation: A limited number of rooms has been reserved for the benefit of the conference participants at the Novotel Amsterdam Schiphol Airport, Phone: +31 207219180, Email: H7060@accor.com.
Please refer to “VDI Conference”. For more hotels: www.vdi-wissensforum.de/hrs

VDI Wissensforum service package: The conference package includes the conference documents (online), beverages during breaks, lunch and the get together on April 25, 2018.

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Any cancellation that reaches us after this deadline will entail the conference attendance fee as stated in our invoice to be charged in full. The date of the post office stamp of your written cancellation will be the decisive criterion. In that case, we will gladly mail you the conference documents on request. Subject to agreement, you may name a substitute participant. Individual parts and sections of conferences and seminars cannot be booked. You will be informed without delay if an event has to be cancelled for unforeseeable reasons. In that instance, you will be entitled only to a refund of your conference attendance fee if already paid. We reserve the right to exchange speakers and/or change the program sequence in exceptional cases. In any case, the liability of VDI Wissensforum GmbH is restricted exclusively to the conference attendance fee.

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Yes, I will participate as follows:

- Participation Fee + VAT
  - VDI Conference 25.–26.04.2018 (01KO927018) € 1,590
  - Workshop 24.04.2018 (01ST915001) € 850
  - Workshop 24.04.2018 (02ST911001) € 850
  - Package Price (conference + 1 workshop) € 2,190


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