

automotive **CAE** GRAND CHALLENGE

September 29 – 30
Congress Park Hanau
Germany

// CAE GENERAL: INFLUENCE OF **SCATTER** ON SIMULATION RESULTS

// CAE PROCESS: EVALUATING SIMULATION AND TEST
RESULTS WITH AI + ML

// CRASH: MODELING OF **WHEELS FOR SMALL OVERLAP TEST**

// DURABILITY: DURABILITY OF **WELDED CONNECTIONS**

// NVH: **ACCURACY** OF ACOUSTIC SIMULATIONS

// OPTIMIZATION: USE OF **REDUCED ORDER MODELING**
FOR FAST OPTIMIZATION

// SAFETY: USE OF **HUMAN BODY MODELS** IN
AUTONOMOUS VEHICLE SAFETY

www.carhs.de/grandchallenge



AUTOMOTIVE CAE
GRAND CHALLENGE 2020
SEPTEMBER 29 – 30, 2020

CAE-based product development

In the last 30 years computer simulation has become an indispensable tool of automotive development. Tremendous progress in software and computer technology makes it possible today to assess product and process performance before physical prototypes have been built.

Challenges in virtual vehicle development

Despite of significant progress in simulation technology and impressive results in industrial application there remains a number of challenges.

Grand Challenge as a platform for dialog

The automotive CAE Grand Challenge stimulates the exchange between users, scientists and software developers in order to solve these challenges. Annually the current challenges in automotive CAE are being identified through a survey among simulation experts. In the conference one session is dedicated to each of the most critical challenges, the "Grand Challenges".

Current critical challenges of automotive CAE

In September 2019 the Grand Challenges for 2020 have been identified through a survey among simulation experts:

- ▶ **CAE General:** Influence of Scatter on Simulation Results
- ▶ **CAE Process:** Evaluating Simulation and Test Results with AI + ML
- ▶ **Crash:** Modeling of Wheels for the Small Overlap Test
- ▶ **Durability:** Fatigue of Welded Connections
- ▶ **NVH:** Accuracy of Acoustic Simulations
- ▶ **Optimization:** Use of Reduced Order Modeling for Fast Optimization
- ▶ **Safety:** Use of Human Body Models in Autonomous Vehicle Safety

In the sessions CAE experts from industry, research and software development will explain the importance of the individual Grand Challenge for the virtual car development process and report on their efforts to overcome the challenge.

Industry
Requirements

Science &
Research

Software
Development

PARTNER WORKSHOPS

SEPTEMBER 29: 11:15 – 12:55 | CONFERENCE ROOM 5



BETA CAE Systems Workshop

RETOMO: The new era of segmentation exploiting Machine Learning

Continuing to provide innovative solutions in CT image segmentation, BETA CAE Systems introduces cutting-edge machine learning algorithms in RETOMO. This new technology application improves segmentation results and drastically reduces user time and effort, in a minimal and friendly user interface.

The session introduces this new capability and will cover:

- ▶ The complete brand-new machine learning functionality of RETOMO.
- ▶ Comparison between the new and traditional segmentation algorithms.
- ▶ Manual Segmentation tools.
- ▶ RETOMO's capacity to handle extremely large scans
- ▶ How to achieve seamless interaction between RETOMO, ANSA, and META.

PARTNER WORKSHOPS

SEPTEMBER 29: 14:00 – 17:00 | CONFERENCE ROOM 5



HEXAGON



MSC Software Workshop

ODYSSEE: Artificial intelligence in convenient user interface

Based on existing analysis results, tests or other data, the software ODYSSEE predicts the results for new parameter combinations within a few seconds. It works also for strongly nonlinear behaviour which would take hours to analyse with traditional CAE, like crash, rupture or material failure. ODYSSEE can interpolate time series and create result files like hdf5 and d3plot, for animations directly in ODYSSEE or in your postprocessor. Parameters can be optimized e.g. to fit results to a test curve. A variety of statistical plots can be shown to get a better insight into the available data.

You can try the software with its easy-to-learn user interface yourself in the hands-on workshop.

Agenda

- ▶ Overview: AI, machine learning, reduced order modeling in CAE; industry examples
- ▶ Overview of user interface
- ▶ Hands-on workshop: interpolation, animation, optimization
- ▶ Short break Overview of DOE and FEM model parser
- ▶ Hands-on workshop: DOE and parser
- ▶ Demo of statistics plot tool
- ▶ Discussion

PARTNER WORKSHOPS

SEPTEMBER 30: 8:30 – 12:30 | CONFERENCE ROOM 5



Automotive Solution Center for Simulation

asc(s) Workshop

NVH Simulation for Hybrid and Electric Vehicle Powertrain

The increasing powertrain electrification in hybrid and electric vehicles is leading to unique NVH challenges for OEMs and suppliers. The central game changer is the elimination of noise from the internal combustion engine (ICE), which unveils various other noise contributors or make them more audible and prominent. Since NVH characteristics of the vehicle is critical to satisfy customer expectations, NVH refinement is an important aspect of powertrain development and the vehicle integration process. Another important aspect is the influence of the reduced exterior noise levels on pedestrian safety. In order to ensure competitiveness in a dynamic market, automotive OEMs and suppliers need to react fast and develop innovative vehicle models rapidly.

[More information](#)

- ▶ NVH Simulation Methodology on Electric Powertrain Noise
- ▶ Low and High Frequency Challenges
- ▶ Electric Motor Noise
- ▶ Drivetrain-related Interior Noise
- ▶ Minimizing Undesired Noise from Powertrain Components
- ▶ Driveline Connections
- ▶ Non-continuous Torque
- ▶ Electromagnetics
- ▶ Cross-domain Simulation Tools
- ▶ ...

TUESDAY, SEPTEMBER 29, 2020

09:00 **Welcome and Introduction**
Dr.-Ing. Dirk Ulrich - carhs.training gmbh

Parallel Sessions 09:30 – 12:55

LOCATION: BRUEDER GRIMM SAAL

// CAE GENERAL: INFLUENCE OF SCATTER ON SIMULATION RESULTS

Chair: Dr.-Ing. Robert Schilling - Ford-Werke GmbH

- 09:30** **Variation and Scatter in Numerical Experimentation**
Georg Eichmüller - Volkswagen AG
- 09:55** **Strain-Rate Dependent Distribution Functions for Stochastic
Fracture Simulation of Glass and Glassy Polymers**
Prof. Dr.-Ing. habil. Stefan Kolling, Marcel Berlinger, Christopher
Brokmann - TH Mittelhessen University of Applied Sciences
- 10:20** **Modelling of Material Uncertainties in Long Fiber Reinforced
Composites**
Dr.-Ing. habil. Jörg Hohe, Dr. Carla Beckmann - Fraunhofer-
Institut für Werkstoffmechanik IWM
- 10:45** **Coffee and Networking**
- 11:15** **Consideration of polymorphic Uncertainties for early and
late development Phases**
Prof. Dr.-Ing. habil. Fabian Duddeck - Technical University
of Munich
- 11:40** **Handling Material Scatter – Case Studies**
Peter Reithofer, Michael Rollant, Harish Kalyan Ram Pothukuchi,
Benjamin Hirschmann - 4a engineering GmbH
- 12:05** **Influence of Material Scatter to Simulation Results with
ALTAIR RADIOSS**
Marian Bulla - Altair Engineering GmbH
- 12:30** **How Robust Solver and Modelling Techniques can help
to analyse Physical Scatter/Variabilities**
Peter Ullrich, Dr. André Berger - ESI Engineering System
International GmbH; Thorsten Queckbörner - ESI Software GmbH
- 12:55** **Lunch Break**

TUESDAY, SEPTEMBER 29, 2020

09:00 Welcome and Introduction
Dr.-Ing. Dirk Ulrich - carhs.training gmbh

Parallel Sessions 09:30 – 12:55

LOCATION: CONFERENCE ROOM 1–4

// OPTIMIZATION: USE OF REDUCED ORDER MODELING FOR FAST OPTIMIZATION

Chair: Alexander Frederic Walser - ASC-S Automotive Solution Center for Simulation e. V.

09:30 Application of reduced Order Modeling in Crashworthiness and Restraint System Optimization
Dr. Tsuyoshi Yasuki - Toyota Motor Corporation

09:55 Automatic Model Reduction Techniques for the Acceleration of Car Crash Simulations
Jun.-Prof. Dr.-Ing. Jörg Fehr, Dark Milakovic, Dennis Grunert - University of Stuttgart

10:20 Activities for Speed up the Optimization Processes in Car Body Design
Jana Büttner - Dr. Ing. h. c. F. Porsche AG;
Prof. Dr.-Ing. Axel Schumacher - University of Wuppertal

10:45 Coffee and Networking

11:15 Reduced Order Modelling for Correlation Analysis of Crash Structures
Stefan Mertler, Clemens-August Thole - SIDACT GmbH;
Prof. Dr.-Ing. Axel Schumacher - University of Wuppertal

11:40 BIW Development on early Stages using Multidisciplinary Optimization
Nikolai Kharaldin, Oleg Klyavin - CompMechLab Ltd.

12:05 Automatic submodel-based Multi-Level Optimization of Crash Structures
Leyre Benito Cia, Claudius Schöne - GNS Gesellschaft für numerische Simulation mbH; Sven Wielens - Bergische Uni Wuppertal; Prof. Dr.-Ing. Axel Schumacher - University of Wuppertal

12:30 Using Reduced Order Models for real-time Optimization
Dr. Kambiz Kayvantash - CADLM

12:55 Lunch Break

LOCATION: BRUEDER GRIMM SAAL

**// SAFETY: USE OF HUMAN BODY MODELS
IN AUTONOMOUS VEHICLE SAFETY**

Chair: Mark Gevers - TECOSIM Technische Simulation GmbH

- 13:55 **Challenge Description and Industrial Requirements**
Dr. Saeed David Barbat - Ford Motor Company
- 14:20 **Human Body Models for Passenger Safety in Autonomous Vehicles**
Dr. Alessandro Scattina, F. Germanetti, D. Fiumarella,
G. Belingardi - Politecnico di Torino
- 14:45 **Open Source Human Body Models for Virtual Testing – the VIVA+ Model Family**
Jobin John, Dr. Johan Iraeus - Chalmers University of Technology;
Dr. Corina Klug - Graz University of Technology; Astrid Linder -
VTI - Swedish National Road and Transport Research Institute
- 15:10 **Analysis of Reclined and Rotated Seating for Autonomous Vehicle Safety using ATD and HBMs in Frontal Impact Configurations**
Rudolf Reichert, Prof. Dr. Cing-Dao (Steve) Kan - George Mason University
- 15:35 Coffee and Networking
- 16:05 **Efficient Pre-Simulation Method for Human Body Models with Odyssee**
Dr. Noriyo Ichinose, Masahiro Takeda, Nobuhiro Taki,
Toru Yoshimach - JSOL Corporation
- 16:30 **Application of GHBMC Models to Address the Technical Challenges of Autonomous Vehicle Safety System Development**
Dr. Matthew L. Davis - Elemance, LLC et al.
- 16:55 **Use of New Crash Test Dummy (Models) for Autonomous Vehicle Safety**
Ismail Maatouki, Christian Kleessen - Humanetics Europe GmbH;
Zaifei Zhou, Dr. Jerry Wang - Humanetics Innovative Solutions, Inc.

LOCATION: CONFERENCE ROOM 1–4

// NVH: ACCURACY OF ACOUSTIC SIMULATIONS

Chair: Dr.-Ing. Torben Birker - TECOSIM Technische Simulation GmbH

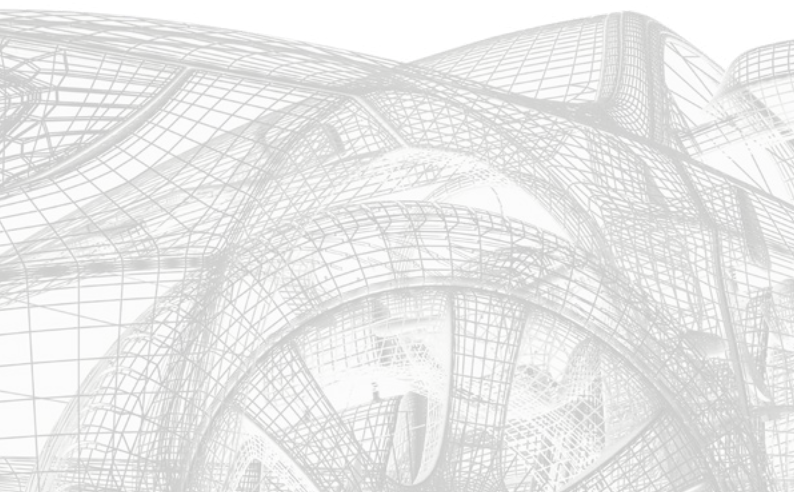
- 13:55 **Challenge Description and Industrial Requirements**
Lars Eilers - GNS mbH
- 14:20 **Noise Source Simulation for the Holistic Investigation of Shock Absorber Knocking Noise**
Thomas Böttcher - ika Institut für Kraftfahrzeuge - RWTH Aachen University et al.
- 14:45 **Improving Accuracy on Both Low and High Frequency Methods**
Willem van Hal - ESI Group; Dr. Oliver Goy - ESI Engineering System International GmbH
- 15:10 **Realistic Acoustic Simulations of Automotive Audio Systems to Implement a Digital Twin**
Dr. Alfred J. Svobodnik - Mvoid Group | Mvoid Technologies GmbH; Tommaso Nizzoli, Ralph Haddad - Mvoid Technologies GmbH
- 15:35 Coffee and Networking
- 16:05 **Improved Prediction of the Vibration Behavior of Short-Fiber Reinforced Engine Brackets as a Basis for NVH Simulation**
Dr. Wolfgang Korte - PART Engineering GmbH; Dr. Kristin Raschke - Daimler AG
- 16:30 **Interior Comfort Challenges – Solutions for improved Acoustics in Combination with Weight Reduction**
Eberhard Erb - FFT Free Field Technologies
- 16:55 **Accuracy and Effort of Acoustic Simulations in Automotive Engineering**
Dr.-Ing. Olgierd Zaleski, Dr. Sören Keuchel, Andreas Klut, Henning Lohmann - Novicos GmbH

LOCATION: BRUEDER GRIMM SAAL

**// CRASH: MODELING OF WHEELS FOR THE
SMALL OVERLAP TEST**

Chair: Dr.-Ing. Axel Hänschke - CPS Pekka Stuckert Consulting
Unternehmensberatung

- 09:00 **The Challenge – Modeling for Simulating the Small Overlap Crash**
Dr. Ulf Bunge, Mario Ubaldo - Volkswagen AG
- 09:25 **Modeling Strategies for Rims Under Small Overlap Crash
Conditions**
Christian Kurzböck - VIRTUAL VEHICLE Research GmbH et al.
- 09:50 **Modeling of a Car Wheel and Numerical Investigations
for Crash Application**
Yann Léost, Pascal Collins, Thomas Haase, Jörg Mermagen -
Fraunhofer-Institut für Kurzzeitdynamik Ernst-Mach-Institut, EMI
- 10:15 Coffee and Networking
- 10:45 **Efficient Modelling of Detailed Components for Small Overlap
Using New Approaches**
Jean-Christophe Allain - ESI Group et al.
- 11:10 **Heuristic Approach of Modelling Wheels for Crash Applications
with Altair HyperWorks**
Marian Bulla - Altair Engineering GmbH et al.

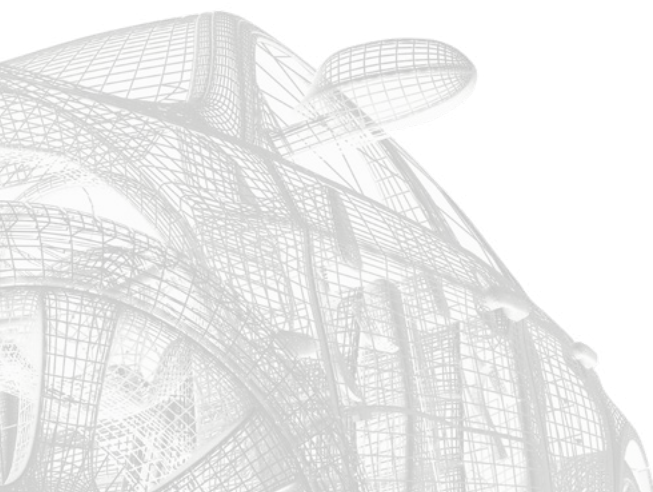


LOCATION: CONFERENCE ROOM 1–4

// DURABILITY: FATIGUE OF WELDED CONNECTIONS

Chair: Frank Braunroth - SEGULA Technologies GmbH

- 09:00 **Fatigue Assessments of Welded Structures in Vehicle Developments**
Dr.-Ing. Matthias Weinert, Dr. Philipp Römelt,
Lorand Kalotai - Ford-Werke GmbH
- 09:25 **Fatigue Assessment of Welded Thin Sheets – New and Reliable Numerical Approaches**
Dr.-Ing. Jörg Baumgartner - Fraunhofer-Institut für Betriebsfestigkeit und Systemzuverlässigkeit LBF
- 09:50 **Seam Weld Fatigue – New Developments for Notch Stress based Analysis**
Dr. rer. nat. Michael Hack - Siemens Industry Software GmbH
- 10:15 Coffee and Networking
- 10:45 **Title tba.**
Dr. Pawel Sobczak - Dassault Systemes UK Limited
- 11:10 **Modern Fatigue Life Prediction of Welded Joints – Modelling, Definition and Assessment**
Klaus Hofwimmer - Magna Powertrain ECS Steyr GmbH & Co. KG



LOCATION: BRUEDER GRIMM SAAL

CAE PROCESS: EVALUATING SIMULATION AND TEST RESULTS WITH AI + ML

Chair: Dr.-Ing. Dirk Rensink - sem engineering methods AG

- 11:40 Challenge Description and Industrial Requirements
Dr. Joachim Sprave - Mercedes-Benz AG
- 12:05 Using Machine Learning to Simplify the Analysis of Simulation Results
Prof. Dr. Jochen Garcke, Dr. Rodrigo Iza-Teran - Fraunhofer-Institut für Algorithmen und Wissenschaftliches Rechnen SCAI
- 12:30 Lunch Break
- 13:30 Prediction of Simulation Results with Integration of SDMZIP in SCALE SDM Solutions
Marko Thiele, Akhil Pillai - SCALE GmbH;
Stefan Mertler - SIDACT GmbH
- 13:55 An Open Platform for ML/AI Driven Simulation Data Analysis
Claudius Schöne, Bernd Römer - GNS Gesellschaft für numerische Simulation mbH
- 14:20 Artificial Intelligence in Automotive CAE – with Practical Examples
Cornelia Thieme - MSC Software GmbH
- 14:45 Coffee and Networking
- 15:15 Automated Evaluation in Simulation Data Management with Artificial Intelligence Based on Uniform Data Formats and Visualizations
Dr. Andreas Kuhn - Andata Entwicklungstechnologie GmbH et al.
- 15:40 Metamodel of Optimal Prognosis – A Framework for Machine Learning and Artificial Intelligence applied in CAE
Dr. Roland Niemeier, Dr.-Ing. Johannes Will, Thomas Most - Dynardo GmbH
- 16:05 Machine Learning for CAE Simulations: Predicting the Best Time to Submit a Job
Tobias Grosch - GNS Systems GmbH
- 16:30 Summary – Fare Well
Rainer Hoffmann - carhs.training gmbh

AUTOMOTIVE CAE
GRAND CHALLENGE 2020
SEPTEMBER 29 – 30, 2020



REGISTRATION

- ☐ Yes, I will attend the **Automotive CAE Grand Challenge 2020** on September 29 – 30, 2020. The registration fee is **EUR 980** (until September 01, 2020, thereafter EUR 1,180).
- ☐ Yes, I will attend the **asc(s) Workshop** on September 30, 2020. The registration fee is **EUR 130** (EUR 90 for asc(s) members)

Title	First Name
Name	
Department	
Phone	
E-Mail	
Company	
Postcode/City	
Address	
Invoice to	
Date/Signature	

Terms & Conditions

The registration fee excludes VAT. It includes detailed conference proceedings as pdf files on a USB flash drive, lunches, refreshments and the evening reception. The registration fee is due 10 days after invoicing. Free cancellation is possible until 4 weeks before the beginning of the event. Participants who cancel later than 4 weeks before the event but earlier than 2 weeks before the event are liable for 50% of the registration fee. Participants who cancel later than 2 weeks before the event, or who do not attend, are liable for the entire registration fee. The number of participants is limited. carhs.training gmbh reserves the right to vary or cancel the event in the light of bookings and to vary the duration and content without prior notice. In the event of cancellation, carhs.training gmbh will refund all monies paid to carhs.training gmbh with respect to the event. The program is subject to change without notice. **Universities and public research institutes receive a 40% discount on the registration fees.**

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EXHIBITORS

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This event is organized by
carhs.training gmbh
Siemensstraße 12
D-63755 Alzenau, GERMANY
www.carhs.de

Tel. + 49 6023 96 40 60
Fax + 49 6023 96 40 70
trainingcenter@carhs.de

Congress Venue:
Congress Park Hanau
Schlossplatz 1
D-63450 Hanau, GERMANY
www.cph-hanau.de

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