RedCabin

International Conference

Next Generation

Steering Systems USA 2019

26 – 27 MARCH 2019 | GM Heritage Center, Sterling Heights, MI, USA

Venue

GM Heritage Center

Chaired by **Ade Badiru**

Steering Technical Expert

GM

Ford · General Motors · Bosch Invented for life · Volkswagen · thyssenkrupp · Universität Stuttgart · ILS · nexteer automotive · Federal Aviation Administration · ZF · Volvo

Partners: infineon · Molykote · ansible motion

Sponsors: Nylacast Automotive · swoboda technologies · Verocel · MVO GMH Gruppe

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Dear colleague,

The first annual **Next Generation Steering Systems USA conference** will be in the **General Motors Heritage Center** located in the heart of the American automotive industry, Michigan. The Heritage Center is a tribute to the history of transportation and provides **a perfect backdrop for an exchange of ideas** on the industry's future.

We have been on an **incredible journey** over the last decade as we witness **the transformation of mobility in real-time** and **adjust to disruptive technological change on multiple fronts.** The vision for this conference is to **provide industry professionals with a forum for deep and meaningful dialogue** on the common challenges we face. **The Red Cabin team** has assembled an outstanding program for us that reflects these challenges with topics including **Steer-by-Wire, autonomous controls, 48V electrification, safety, performance,** and more. To add diversity to the discussion, the conference will feature **presentations and cross-functional panel discussions** from **automotive and aircraft industry experts.**

The future promises technologies that are transformational, ideas that are grand, and obstacles that are extraordinary. The Next Generation Steering System USA conference will offer **an excellent forum** to take a step closer in **transforming 'the future' into reality.** I look forward to meeting you in Sterling Heights, MI, USA in March 2019.

Conference Chairman: Ade Badiru, *Steering Technical Expert, General Motors*

CONFIRMED SPEAKERS AND GUESTS

Garry Smith
Global Steering Technical Leader
Ford Motor Company

Prof. Dr.-Ing. Reinhard Reichel
Director of the Institute of Aircraft Systems
University of Stuttgart

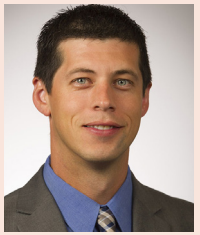
Brad Hochrein
Advanced and Core Steering/TE
Ford Motor Company

Brian Siskoy
Subsystem Lead Engineer Autonomous Steering Electronics
General Motors

Anders Hansson
System Architect
Volvo Car Corporation

George Doerr
Global Steering *Technical Leader*
General Motors

Phil Morse
International *Manager, Commercial Group*
Ansible Motion Ltd.



Gary Weber
Application *Engineer*
MOLYKOTE Speciality Lubricans

Joe Klesing
Executive Director Autonomous Steering & Comfort
Nexteer Automotive

James V. Chelini
President
Verocel, Inc.

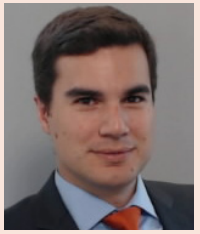
Dr. Johannes Grau
Project Management HAD Steering Systems
Volkswagen AG

Michael Westpfahl
Product Group Head Position & Current Sensors
Infineon Technologies AG

Joe Wlad
Vice-President Sales, Marketing and Business Development
Verocel, Inc.

Sunny Tang
BOM Family Owner - Controlled Steering Systems
General Motors

Rudy Audi
Senior Manger - Software
Robert Bosch - Automotive Steering



Manuel Diez-Rodriguez
Director of Engineering
Robert Bosch - Automotive Steering

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DURING THIS TWO DAY CONFERENCE YOU WILL

- learn about safety architectures for steer-by-wire
- identify the impact of steer-by-wire on processes on the whole system
- discuss about needs for mechanical redundancy in steering and suspension components for autonomous vehicles
- get an insight into advanced integrated avionics platform with highly fault tolerant fly-by-wire applications
- find out about power supply implications for future steering systems
- compare and learn about fail-safe/fail-operational mechanisms of x-by-wire systems of different industries
- assess methods to verify software integrity
- get updated on level 3 and level 4 of automated driving

WHAT YOU WILL EXPERIENCE ON SITE

RELATION BOARD

Get in touch with other experts before the conference starts. Take a look at the business cards and photos while enjoying your first conversations and networking experience.

MEET AND GREET

Make new business acquaintances in short 1:1 meetings. Exchange your business cards in this fast paced ice breaking session. Make sure you bring enough to not run out.

AUDIENCE Q&A

Interact with our conference speakers and moderators, and ensure, that all of your questions are answered during these sessions.

OFFSITE NETWORKING RECEPTION

Enjoy an informal evening get-together with your peers to discuss the outcome of the first conference day and expand your network in a relaxed ambience.

WORKING GROUPS

Discuss with our moderators and your peers latest challenges and developments of steering systems and further steering related topics in this interactive sessions. You are very welcome to share your ideas and experiences in the working groups.

CROSS-INDUSTRY SESSIONS

Enjoy our cross-industry sessions to get an insight in the state of the art of steering systems of aviation, agricultural machinery and automotive industries.

ATTENDEES` PROFILE ** AVIATION ** AUTOMOTIVE

CTO/VP/GLOBAL LEADER/DIRECTOR/CHIEF ENGINEER/TEAM LEAD/TECHNICAL LEAD/HEAD OF/MANAGER OF
Engineering R&D, Systems & Control, EPS Steering, Chassis Control, Steering Controls, Flight Controls, X-by-Wire Systems, Autonomous Steering Controls, Vehicle Dynamics, Electrical Engineering, Development Steering Systems, Suspension, Axles & Steering, Technology and Innovation, Safety, Advanced Data Analysis and Application, Autonomous Vehcile and ADAS, Automation

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THIS IS WHAT EXPERTS OF OUR PAST AUTOMOTIVE EVENT EXPERIENCED

„Perfect opportunity to get a better understanding and further learning about the future of the technology“
48V Power Supply System Owner, Jaguar Land Rover Ltd.

„Well organized, good speakers, really high level representatives“
Executive Chief Engineer Base Powertrain, AVL List GmbH

„Lots of relevant presentations with good information and interesting attendees to discuss with“
Control Systems Technical Specialist Powertrain Control and Electronics, Changan UK R&D Centre Ltd.

„Good to understand what`s coming“
CTO, Borg Automotive

„For me it was a good balance of presentations from OEM, Tier1 and scientists“
Battery Project Engineer, Hitachi Automotive

„Right size, good opportunity to network, expertise of the audience and presenters, good organization“
Vice President, Engineering Lead Development, SEG Automotive GbmH

„Good mixture of speaker topics, nice interactive activities, detailed information“
Research Scientist, Karlsruhe Institute of Technology

„The organization and the location was very good“
Senior Engineer, Daimler AG

„Very extensive information about the topic in automotive. Very good presentations“
Head of Product Management, Isabellenhuette Häusler GmbH & Co. KG

Next Generation Steering Systems USA 2019

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CONFERENCE DAY 1 | Tuesday 26 MARCH 2019

08:30 Registration and refreshments

Interactive session: RELATION BOARD

Get in touch with other experts before the conference starts. Take a look at the business cards and photos while enjoying your first conversations and networking experience

CURRENT STATUS OF AUTOMOTIVE STEERING SYSTEMS

09:00 Welcome and introduction presentation by the conference chairman Ade Badiru, Steering Technical Expert, *General Motors*

09:20 Autonomous steering actuators and the demise of the intermediate shaft

- Transitioning from steering assist to road wheel actuators
- What makes an autonomous steering system unique
- Autonomous steering safety
- Reduced complexity in autonomous steering systems

Brian Siskoy, Subsystem Lead Engineer - Autonomous Steering Electronics, *General Motors*

09:55 Architecture for highly available steering systems
Functional safety for E/E components is a central aspect for the steering system development in the context of ISO 26262 compliance. With new trends on the market, a fail-safe steering system becomes state of the art.

- Understanding and applying ISO 26262
- Functional safety process to define ASIL C ready architecture
- Fail safe steering system architecture

Rudy Audi, Senior Manger - Software, *Robert Bosch - Automotive Steering*

Interactive session: MEET AND GREET

10:30 Make new business acquaintances in short 1:1 meetings. Exchange your business cards in this fast paced ice breaking session. Make sure you bring enough to not run out.

11:00 Networking refreshment break

Cross-industry sessions: SAFETY & SECURITY ASPECTS OF X-BY-WIRE SYSTEMS IN VARIOUS INDUSTRIES

11:30 Advanced integrated avionic platform

- Highly fault tolerant (fly-by-wire applications)
- Middle-/Side-Ware taking over all platform management tasks
- Process-chain based on Model Integrated Computing (MIC) ensuring highly automated platform instantiation and qualification compliant with airworthiness regulations

Prof.-Dr. Reinhard Reichel, Director of the Institute of Aircraft Systems, *University of Stuttgart*

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CONFERENCE DAY 1 | Tuesday 26 MARCH 2019

12:05 Software integrity – striving to innovate safely

- Aviation guidance - Gradual transition to risk based certification
  - Overarching properties - uses intent, correctness, and acceptability to create an assurance based framework
  - Abstraction layer - proposes use of higher-level objectives that can be mapped to alternative standards
- Process assurance acceptance – company processes vs. project processes
- Approval of autonomous systems – artificial intelligence/ machine learning, how can we trust them?

James V. Chelini, President, *Verocel, Inc.*

12:40 Interactive session: PANEL DISCUSSION

Fly-by-Wire architectures versus X-by-Wire architectures - where are the commonalities - where are the differences

- Safety, integrity, reliability, availability (dispatchability)
- Specific aspects such as common mode failures, design errors
- Approaches in architecture

MODERATION: **Prof.-Dr. Reinhard Reichel,** Director of the Institute of Aircraft Systems, *University of Stuttgart*

13:15 Networking luncheon

14:45 Interactive sessions: WORKING GROUPS

The audience will be divided into 3 groups. Each group will attend all 3 interactive working groups.

WORKING GROUP I

Steer by Wire (SbW): Steering feel requirements and challenges

- What are the steering feel requirements for SbW systems and what are the challenges in delivering that attribute?
- In answering the above question, what use cases are considered and what are the unique challenges for each?
- Also, what are the vehicle size and type implications for achieving steering feel requirements?

HOSTED BY: **Garry Smith,** Global Steering Technical Leader, *Ford Motor Company*

WORKING GROUP II

Innovation on fail-safe EPS

- Safety enhanced by redundancy
- Impact on component weight and design such as ECU wiring, motor coils and sensor structure
- Latest experiences and future development

HOSTED BY: **Anders Hansson,** System Architect, *Volvo Car Corporation*

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CONFERENCE DAY 1 | Tuesday 26 MARCH 2019

WORKING GROUP III

Safety architecture for SAE level 2
This session will explore the following:

- Safety enhanced by redundancy for SAE level 2
- Strategies for enhanced ADAS functions
- Architecture options for ADAS

HOSTED BY: **Manuel Diez-Rodriguez,** Director of Engineering, *Robert Bosch - Automotive Steering*

16:15 Refreshment break and networking

16:45 CONTINUING WITH WORKING GROUPS I, II AND III

17:30 Results of the WORKING GROUPS presented by the moderators

18:00 Closing remarks of Ade Badiru

Interactive session: NETWORKING RECEPTION

19:00 Enjoy an informal evening get-together with your peers to discuss the outcome of the first conference day and expand your network in a relaxed ambience.

CONFERENCE DAY 2 | Wednesday 27 MARCH 2019

08:30 Registration and refreshments

08:55 Opening remarks of the conference chairman Ade Badiru

INNOVATION ON AUTOMOTIVE STEERING SYSTEMS

09:00 Steering feedback perception and feedback strategies

- Steering response
- Steering feedback design
- Objectivization of steering feedback
- Future of steering feedback

Johannes Grau, Project Management HAD Steering Systems, *Volkswagen AG*

09:35 Safety architectures for steer-by-wire

- Design principles
- Discussion of architecture options
- Fail-operational performance
- User clinic results

Joe Klesing, Executive Director Autonomous Steering & Comfort, *Nexteer Automotive*

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CONFERENCE DAY 2 | Wednesday 27 MARCH 2019

10:10 Advanced lubricant technologies for the future of vehicle steering systems

- Steering lubricants: From traditional lubrication to next-generation solutions; our evolving lubrication technology for next-generation challenges
- The role lubricants can play in design requirements for next-generation steering systems
- Driver connection to the vehicle/road as technology changes
- Solutions for specific challenges, such as steer-by-wire, the cost of friction in grease, mass reduction and generational life expectancies

Gary Weber, Application Engineer, *MOLYKOTE Speciality Lubricants*

10:45 Networking refreshment break

ALTERNATIVE REDUNDANCY CONCEPTS FOR THE STEERING

11:15 Methods to verify software integrity

- Current concepts to very software integrity
- Importance of evaluation of software integrity
- Future outlook

Joe Wlad, Vice-President Sales, Marketing and Business Development, *Verocel, Inc.*

11:50 Semiconductor sensing solution a for 12V to 48V fail operational steering systems

- Current challenges for semiconductor sensors
- Aspects of mechanical and electrical system integration
- Concepts for redundant and diverse solutions and architectures in cars and commercial vehicles

Michael Westpfahl, Product Group Head Position & Current Sensors, *Infineon Technologies AG*

12:25 Networking luncheon

13:55 Interactive sessions: WORKING GROUPS

The audience will be divided into 3 groups. Each group will attend all 3 interactive working groups.

WORKING GROUP I

Need for mechanical redundancy in steering systems for autonomous vehicles (AV)

- How does the industry develop methods and standards for assessing mechanical reliability?
- How does the industry use those to determine reliability levels required for AV operation?
- What are the concepts that address the resultant needs for mechanical redundancy for steering systems in AV?

HOSTED BY: **Garry Smith,** Global Steering Technical Leader, *Ford Motor Company*

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CONFERENCE DAY 2 | Wednesday 27 MARCH 2019

WORKING GROUP II

Power supply implications for future steering systems

Current state power supply:

IC engine	BEV/Hybrid
Lead acid battery	Lead Acid/Lithium (300+)/ Lithium (12/48)
Alternator	DC/DC Converter(s)
Limited monitoring	Continuous monitoring

- Methods to guarantee adequate power supply for future steering systems
- How to secure redundancy in the power supply
- Regarding both of these aspects:
  - What does a customer expect for failures or degradation?
  - What is the impact of environmental conditions…cold/hot temp, etc.?
  - What are the expected hardware and architecture trends?
  - What are the enablers?
  - How will the industry drive down cost?

HOSTED BY: **Brad Hochrein,** Advanced and Core Steering/TE, *Ford Motor Company*

WORKING GROUP III

Driver-in-the-Loop (DIL) simulator technologies for steering system development and evaluation

- Connecting real people with imagined vehicle systems
- Building a virtual test drive lab: Hardware and software considerations
- Simulation checklist for steering system designers
- Who's the "Driver" in Driver-in-the-Loop?: Addressing Autonomous Levels 0-5

HOSTED BY: **Phil Morse,** International Manager, Commercial Group, *Ansible Motion Ltd.*

15:25 Refreshment break and networking

15:55 CONTINUING WITH WORKING GROUPS I, II AND III

16:40 Results of the WORKING GROUPS presented by the moderators

17:10 Closing remarks of the conference chairman Ade Badiru

END OF CONFERENCE

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PARTNERS:

Infineon designs, develops, manufactures and markets a broad range of semiconductors and system solutions. The focus of its activities is on automotive electronics, industrial electronics, RF applications, mobile devices and hardware-based security. Combining entrepreneurial success with responsible action, at Infineon we make the world easier, safer and greener. Barely visible, semiconductors have become an indispensable part of our daily lives. Infineon's components play an essential role wherever electric energy is generated, transmitted and used efficiently. Furthermore, they safeguard data communication, improve safety on roads and reduce automotive emissions.

MOLYKOTE™ brand specialty lubricants are designed and engineered to solve your difficult lubrication-related problems and save energy by reducing friction and wear. Along with the MOLYKOTE™ brand, users have access to lubrication experts with broad application expertise to focus on improving equipment reliability, which enhances your bottom line.
Our technical support staff provides services and solutions utilizing lubrication best practices.

Founded in 2009, Ansible Motion creates and deploys technology associated with the physical and logical simulation of human-directed/occupied vehicles. We offer a range of automotive Driver-in-the-Loop (DIL) simulators featuring advanced computational and mechanical performance capabilities, and industry-unique immersion solutions that create compelling virtual worlds for drivers and product development engineers. Ansible Motion DIL simulators are used by automotive and research organisations around the globe to place real people into direct contact with imagined vehicles, on-board systems and situations. Our DIL simulators are designed, built and developed at our factory and R&D Centre in Hethel, England.

SPONSORS:

Nylacast Automotive is a world-leading designer and volume producer of high-precision polymer assemblies and components. For over 15 years Nylacast Automotive have been delivering pioneering advancements and working with Customers to establish the optimum performance in safety and efficiency for polymers in worm wheel gears for EPS systems. Nylacast Polymeric materials have ideal properties in strength and low coefficient of friction to support the technological advancements and demands in EPS systems of today and the future.

Swoboda is your global partner for the design, development and production of complex mechatronic components. Specializing in high precision metal-plastic composite parts, sensors, actuators and electronics with innovative solutions for the electrification of the mobility industry and beyond.

Verocel's expertise in RTCA/DO-178 and DO-254, IEC 61508, ISO 26262, EN 50128 and IEC 62304 certification standards enables our customers to meet regulatory compliance for hardware and software. Our unique skills in certification of complex hardware, software components, partitioning and constraining runtime applications for use in safety-critical platforms have enabled dozens of customers to succeed.

MVO GmbH is one of the few companies in the pioneering automotive steering systems segment that possesses decades of experience. Our core area of business focuses on VGR (Variable Gear Ratio), forged steering racks from early project initiation stage and engineering support to serial production. MVO GmbH also manufacture blanks, semi-finished products, prototypes, small series, and after-sales products for all kind of steering applications.

ARE YOU A SUPPLIER IN THIS FIELD?

Would any of the following help you with business goals?

- Improved visibility, exposure and market awareness
- A platform to educate customers and show thought-leadership
- Space to optimize networking and demo products

RedCabin provide relevant suppliers with the opportunity to sponsor or partner with the event in exchange for joining the program actively in a variety of different formats.

Please get in touch with
felix.howes@redcabin.de for more details.

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PAYMENT ARRANGEMENTS AND REGISTRATION MODALITIES

DATE	2 DAY CONFERENCE INVESTEMENT
ORIGINAL INVESTMENT	$ 3.195 *

* Investment per delegate

RedCabin are happy to offer OEM's and Tier 1's certain special rates. This is to reflect our commitment to building the best possible audience for our customers to achieve an optimal event.
***Please contact** Felix.howes@redcabin.de for further details.*

The delegate fee includes the following services:

- Catering during the entire conference
- Access to the purchased conference packages
- Conference documentation
- Evening event

PAYMENT TERMS

Payment is due on receipt of the invoice.

PAYMENT METHODS

Pay by bank transfer quoting reference Steering Systems USA:
RedCabin - Monica Wick
Berliner Sparkasse
IBAN: DE70 1005 0000 0190 7054 50
SWIFT-BIC: BELADEBEXXX

ACCOMODATION

A limited number of reduced rate rooms are available at the **Detroit Marriott Troy,** 200 W. Big Beaver Rd. Troy, Michigan 48084. Hotel costs are not included in the price of the conference ticket. Please get in touch for more details.

CONFERENCE VENUE

GM Heritage Center
6400 Center Drive, Sterling Heights, MI 48312, USA

For further information or registration please call:
+49 30 99 40 489 14 and +49 30 9940 489 13
online: www.redcabin.de | email: info@redcabin.de