



Virtual LIVE
17–18 November 2020

International Conference

Next Generation

Steering Systems USA 2020

CHAired BY **Garry Smith**
Global Steering Technical Leader



RedCabin would like to thank last years speakers, partners and sponsors:



GENERAL MOTORS



Universität Stuttgart



Agenda

Partner: **VEHICLE DYNAMICS INTERNATIONAL** **MOLYKOTE** **NYLACAST AUTOMOTIVE**



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Dear colleague,

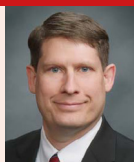
The second annual **Next Generation Steering Systems USA** conference will be held on **November 17-18, 2020**. The conference will build on the very interesting, thought-provoking, and energizing discussions and workshops we had in the 2019 conference. We will again be exploring **cross-industry (automotive, off-highway, aerospace) perspectives** and learning from each other. The RedCabin team has assembled an outstanding program for us that reflects this exciting future with topics including **Steer-by-Wire, autonomous controls, 48V electrification, safety, performance, mechanical implications**, and more. Come participate in a conference with those professionals and visionaries who are **shaping the future of steering systems!**

Conference Chairman: Garry Smith, Global Steering Technical Leader, *Ford Motor Company*

INVITED AND CONFIRMED SPEAKERS AND GUESTS



Brad Hochrein
Advanced and Core Steering/TE
Ford Motor Company



Dr. Michael Hales
Steer-by-Wire Design Lead
Nexeer Automotive



Dr. Jason S. Wou
Core Steering Engineer
Ford Motor Company



George Small
CTO
Moog Inc.



Armin Schymczyk
Core Steering Supervisor
Ford Motor Company



Anand Naik
Chassis Controls Technical Specialist
Ford Motor Company



Raymond G. Rivard
System and Component Engineering Design, Steering Systems, Chassis Engineering
FCA Fiat Chrysler Automobiles



Ade Badiru
Steering Technical Expert
General Motors



George Doerr
Global Steering Technical Leader
General Motors



Dr. Carlos Nuno Veiga Barbosa
Research and Development Manager
Nylacast Automotive



Hossam Almasri
Active Safety, Automated Driving and Chassis Controls Global System Safety
General Motors



Tim Diez
Chassis Electrical Technical Expert
Ford Motor Company



Dr. Christian R. Kelber
Director, Engineering, EFG, Automation & Autonomous Operations
AGCO Corporation



Ferenc Junger
Regional Manager of Column EPS Business in North America
thyssenkrupp presta North America



Tony Dodak
Director, Systems/ Safety and Mechanical Integration
Halla Mechatronics



Scott Wendling
Manager, Systems and Safety
Halla Mechatronics



Sergey Maryanovsky
STA Global Core-Chassis
Ford Motor Company



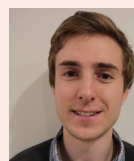
Mike Puleri
Global Steering Manager
Ford Motor Company



Chad Chichester
MOLYKOTE® Specialty Lubricants Application Engineer
DuPont



Dr. Michael Sturm
NVH Specialist and Research Engineering
Robert Bosch Automotive Steering LLC



Lachlan Turner
Upper Steering Design and Release Engineer
Ford Motor Company of Australia



Mauro Pacheco
Steer-by-Wire Subject Matter Expert
General Motors



Alexander Ein Waldt
Technical Expert Steering System Engineering
Ford Motor Company



Dr. Zachary Sabato
Technical Specialist in Vehicle Dynamics and Control
Hyundai Mobis North America



Michael Gaunt
Steering Systems Technical Lead
General Motors



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DURING THE TWO DAY CONFERENCE YOU WILL

- Hear about the **award-winning SAE paper** regarding **"Ball Nut Assembly Modeling"** in the mechanical implications category.
- Identify **similarities** and **differences** among **automotive, Off-Highway**, and **aerospace motion control safety requirements** for **X-by-Wire systems**.
- Discuss **redundant power supply architectures** for **AV & SbW**: Can we develop an **industry standard**?
- Understand **functional safety** as it applies to **robotics** and **autonomy** across **various industries**.
- Learn about latest **developments of EPAS** and its future requirements
- Find out **latest trends** and **challenges** for **commercial steering**.
- Gain insight into **electronics reliability methods** and what the **future needs** are.
- Get to know about **trends** and **challenges** for **commercial steering**.

WHAT YOU WILL EXPERIENCE



AUDIENCE Q&A

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



PANEL DISCUSSION

Benefit from deeper insights by attending panel discussions. Share your ideas and thoughts with peers and receive feedback from dedicated industry experts in this interactive session.



WORKING GROUPS

Discuss the latest challenges and developments of steering systems with moderators and peers in these highly interactive sessions. You are welcome to share your ideas and experiences in the working groups.



NETWORKING RECEPTION

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



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: AUTOMOTIVE – OFF-HIGHWAY – AEROSPACE

CTO | CIO | CDO | VP | DIRECTOR | CHIEF ENGINEER | PRINCIPAL KEY EXPERT | HEAD OF | TEAM LEAD | DESIGN LEAD | SUBSYSTEM LEAD ENGINEER | PROJECT MANAGER

Engineering R&D, Systems & Control, EPS, Chassis Control, Chassis and Vehicle Dynamics, Steering Controls, Flight Controls, X-by-Wire Systems, Autonomous Steering and Comfort, Autonomous Steering Controls, Autonomous Steering Electronics, Vehicle Dynamics, Electrical Engineering, Electric Steering Applications, Development Steering Systems, Suspension, Axles & Steering, Technology and Innovation, System Safety and Integration, System Architect, Multi Sense and Vehicle Control, Advanced Data Analysis and Applications, Autonomous Vehicle and ADAS, Automation, Sales, Marketing and Business Development



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THIS IS WHAT EXPERTS OF OUR PAST EVENTS EXPERIENCED

"Excellent cross-industry discussion. Relevant presentations. Engaging Workshops."

Subsystem Lead Engineer Autonomous Steering Electronics, General Motors

"Inspiring two days, which served as an ideal platform to exchange ideas regarding the upcoming technology trends, as well as the future challenges to overcome as an industry/sector. Unbeatable location and great atmosphere for discussion and networking, thanks also to the participation of numerous OEMs and leading tier 1 suppliers."

*Automotive Steering, Director Product Engineering,
Robert Bosch Automotive Steering LLC*

"It was the right size with the right talents from the industry."

Technical Manager, Zoox

"Very good agenda. Good subject presentations. Great interaction."

Global Chief Engineer Electric Steering Applications, ZF

"I really enjoyed meeting so many people from the industry."

Global Steering Technical Leader, General Motors

"Great job assembling important players in industry, broad range of topics covered."

MOLYKOTE® Application Engineer, DuPont

"Great networking opportunities, interesting keynotes. Display of synergies with other industries."

Senior Program Manager, ITK Engineering

"Very well organized, excellent topics and presentations covered. Nice friendly environment to meet peers and exchange ideas. The working groups were great."

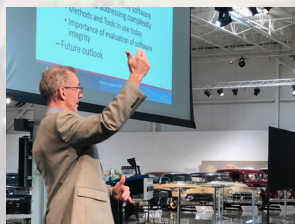
Controls Development Engineer Vehicle Dynamics, GM Canada

"A good, diverse set of topics. Stimulating discussions. RedCabin did a terrific job organizing this conference."

Vice President of Sales, Marketing and Business Development, Verocel

"Very constructive atmosphere, good presentations, very good level of discussions and participants, speednetworking is a good idea and workshops a good alternative to presentations only."

Director Liaison Office Abu Dhabi, Diehl Aerospace Abu Dhabi





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CONFERENCE DAY 1 | TUESDAY 17 NOVEMBER 2020

08:45 AM **Welcome and Introduction Presentation** **Global Standards Adoption for New Technology Steering Systems**

by the Conference Chairman

Garry Smith — Global Steering Technical Leader,
Ford Motor Company

MECHANICAL IMPLICATIONS

09:00 AM **Ball Nut Assembly Modelling**

- Development of physics-based BNA model
- Static load analysis of BNA
- Dynamic friction analysis of BNA
- Path for optimizing the BNA design for steering application

Dr. Jason S. Wou — Ph.D. - Core Engineer, *Ford Motor Company*

STEER-BY-WIRE

09:30 AM **Steer-by-Wire: A Natural Coupling with Automotive Emergency Steering**

- Basics of Automatic Emergency Steering (AES)
- AES and the Euro NCAP roadmap
- Limitations and concerns with AES and EPS
- Benefits of AES with SbW

Dr. Michael Hales — Steer-by-Wire Design Lead,
Nexteer Automotive

10:00 AM **First-principles Physical System Models: Building, Using and Analyzing**

- Bond graphs for mixed energy domain systems
- Physical power-oriented MATLAB/Simulink models
- Signal logic for design, requirements and verification

Dr. Zachary Sabato — Technical Specialist in Vehicle Dynamics and Control, *Hyundai Mobis North America*

10:30 AM *Networking Refreshment Break*



Interactive session: CROSS-INDUSTRY SESSION

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.

11:00 AM **Functional Safety as it applies to Robotics and Autonomy across Various Industries**

- Status quo
- Requirements and challenges
- Who might be learning from whom?

George Small — CTO, *Moog Inc.*



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CONFERENCE DAY 1 | TUESDAY 17 NOVEMBER 2020

11:30 AM Improving Combine Harvester Application with the use of a Steer-by-Wire System

- The future of X-by-Wire technologies in agricultural machines
- Functional safety
- Impacts on machine dynamics

Dr. Christian R. Kelber — Director, Engineering, EFG, Automation & Autonomous Operations, *AGCO Corporation*



Interactive session: PANEL DISCUSSION

Benefit from deeper insights by attending panel discussions. Share your ideas and thoughts with peers and receive feedback from dedicated industry experts in this interactive session.

12:00 AM Similarities/Differences among Automotive, Off-Highway, and Aerospace Motion Control Safety Requirements for XbW Systems

MODERATOR: **Garry Smith** — Global Steering Technical Leader, *Ford Motor Company*

PANELLISTS: **Mike Puleri** — Global Steering Manager, *Ford Motor Company*

George Small — CTO, *Moog Inc.*

Dr. Christian R. Kelber — Director, Engineering, EFG, Automation & Autonomous Operations, *AGCO Corporation*

Armin Schymczyk — Core Steering Supervisor, *Ford Motor Company*

Hossam Almasri — Active Safety, Automated Driving and Chassis Controls Global System Safety, *General Motors*

01:00 PM *Networking Lunch*



Interactive sessions: WORKING GROUPS

Discuss the latest challenges and developments of steering systems with moderators and peers in these highly interactive sessions. You are welcome to share your ideas and experiences in the working groups. The audience will be divided into 3 groups. Each group will attend all 3 interactive working groups.



WORKING GROUP – 1

02:00 PM Redundant Power Supply Architectures for AV & Steer-by-Wire: Can we develop an industry standard?

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

and **Tim Diez** — Chassis Electrical Technical Expert, *Ford Motor Company*



WORKING GROUP – 2

02:00 PM Impact of Tribology on Steering System Reliability & Design

- Key performance factors of steering systems as a whole



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CONFERENCE DAY 1 | TUESDAY 17 NOVEMBER 2020

- Top design issues/challenges and performance requirements for subassemblies and components
- Material selection and design considerations (surface condition, part geometry, wear, friction, NVH/BSR, compatibility, etc.)

HOSTED BY: **Chad Chichester** — MOLYKOTE® Specialty Lubricants Application Engineer, DuPont



WORKING GROUP – 3

02:00 PM What Cross-Industry Standard Requirements that can be adopted for X-by-Wire systems?

HOSTED BY: **Raymond G. Rivard** — System and Component Engineering Design, Steering Systems, Chassis Engineering, *FCA Fiat Chrysler Automobiles*

04:00 PM Networking Coffee Break

04:30 PM Continuing with Working Groups 1, 2 and 3

05:30 PM Results of the Working Groups presented by the Moderators

Each moderator of the Interactive working group is presenting the outcomes of their session

05:45 PM Closing Remarks by the Conference Chairman Garry Smith

END OF DAY 1





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CONFERENCE DAY 2 | WEDNESDAY 18 NOVEMBER 2020

09:25 AM Welcome by the Conference Chairman

Garry Smith — Global Steering Technical Leader,
Ford Motor Company

SIMULATION AND VALIDATION

09:30 AM Predictive NVH Validation of EPS using Experimental Data

- What is NVH and what are typical challenges?
- How can independent characterization of structure-borne sound sources help to address these issues?
- General Outlook of the “Bosch AS test bench approach”

Dr. Michael Sturm — NVH Specialist and Research Engineering, *Robert Bosch Automotive Steering LLC*

10:00 AM Advanced Tribological-mechanical Hybrid Gears for EPS Units

- Defining the engineering requirements for EPS gears
- State-of-the-art gear solutions for EPS
- Lightweight hybrid gear solutions and performance assessment
- Beyond the SOA of gear solutions for EPS and other automotive technologies

Dr. Carlos Nuno Veiga Barbosa — Research and Development Manager, *Nylacast Automotive*

10:30 AM Enabling Agility in Virtual Analysis Techniques for Automotive Controls Systems

- Need for executable models to handle the growing SW complexity
- Awareness to Ford's approach in building internal SW simulation tools & processes
- Aligning with steering supplier partners with common technical strategies

Anand Naik — Chassis Controls Technical Specialist,
Ford Motor Company

11:00 AM *Networking Coffee Break*

BRIDGING THE PATH TO AUTONOMOUS / STEER-BY-WIRE

11:30 AM Agile Tools for Research into Advanced Steering Solutions and Vehicle Motion Control

- Safety and redundancy related challenges for SbW and AD
- Alternative steering functions
- Vehicle Motion Control and redundancies

Ferenc Junger — Regional Manager of Column EPS Business in North America, *thyssenkrupp presta North America*



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CONFERENCE DAY 2 | WEDNESDAY 18 NOVEMBER 2020



Interactive session: PANEL DISCUSSION

Benefit from deeper insights by attending panel discussions. Share your ideas and thoughts with peers and receive feedback from dedicated industry experts in this interactive session.

12:00 AM **Redundancy for steering systems towards automated driving: EPS vs. X-by-Wire Systems**

- Requirements
- Architectures
- Concepts

MODERATORS: **Brad Hochrein** — Advanced and Core Steering/TE, *Ford Motor Company*

and **Tim Diez** — Chassis Electrical Technical Expert, *Ford Motor Company*

PANELLISTS: **Ade Badiru** — Steering Technical Expert, *General Motors*

Lachlan Turner — Upper Steering Design and Release Engineer, *Ford Motor Company of Australia*

Mauro Pacheco — Steer-by-Wire Subject Matter Expert, *General Motors*

Alexander Ein Walddt — Technical Expert Steering System Engineering, *Ford Motor Company*

Tony Dodak — Director, Systems/Safety and Mechanical Integration, *Halla Mechatronics*

01:00 PM *Networking Lunch*



Interactive sessions: WORKING GROUPS

Discuss latest challenges and developments in steering systems with moderators and peers in these highly interactive sessions. You are welcome to share your ideas and experiences in the working groups. The audience will be divided into 3 groups. Each group will attend all 3 interactive working groups.



WORKING GROUP – 1

02:00 PM **Mechanical Reliability for AV & SbW: Can we develop an Industry Standard?**

HOSTED BY: **Dr. Jason S. Wou** — Core Engineer, *Ford Motor Company*



WORKING GROUP – 2

02:00 PM **Safety vs. Reliability – why Reliability is so important**

HOSTED BY: **Scott Wendling** — Manager, Systems and Safety, *Halla Mechatronics*



WORKING GROUP – 3

02:00 PM **Trends and Challenges for Steering Systems in Commercial Vehicles**

HOSTED BY: **Garry Smith** — Global Steering Technical Leader, *Ford Motor Company*
and **Brad Hochrein** — Advanced and Core Steering/TE, *Ford Motor Company*



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END OF CONFERENCE





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PARTNER

MOLYKOTE® MOLYKOTE® Specialty Lubricants by DuPont are designed and engineered to help you solve difficult lubrication-related problems and save energy by reducing friction and wear, which can enhance your bottom line.

Our Smart Lubrication™ solutions – and our lubrication experts with broad application expertise – can help you create the vehicles of the future, with a focus on electrification, lightweighting, durability, quiet comfort and autonomous driving. Our 500+ products include a range of greases, pastes, oils, compounds, dispersions and anti-friction coatings. Learn more at www.molykote.com.



Nylacast Automotive is a world-leading designer and volume producer of high-precision polymer assemblies and components.

Operating from strategically located sites, Nylacast Automotive manufacture and supply safety-critical products that go into hundreds of vehicle platforms across multiple vehicle brands world-wide. Nylacast's unique Research and Development capability provides full engineering solutions from initial concepts and raw chemistry, through to final assemblies and components. This comprises materials development, application engineering, product testing and validation that creates real value for Customers and launches many exciting new products every year.

Nylacast Automotive collaborates with its customers in four key focus areas: Electronic Power Steering, Electric Braking Systems, Transmissions, Turbocharging applications



Vehicle Dynamics International magazine is the world's only international review of next-generation automotive steering, suspension, braking, chassis simulation and testing, and vehicle dynamics electronics and technologies. The magazine is published twice a year and sent to 10,000 senior vehicle dynamicists and programme chiefs: if you would like a copy, please apply for a subscription on our website.

The Vehicle Dynamics International digital platform carries the latest industry news and views, videos and more, and is now available for webinars. www.vehicledynamicsinternational.com





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DATE	2 DAY CONFERENCE INVESTEMENT
BOOK UNTIL NOVEMBER 17 TH 2020	1.700 €

RedCabin is happy to offer OEM's special rates. This is to reflect our commitment to build the best possible audience for our customers.

Please contact Erutode.Rume@redcabin.de for further details.

The delegate fee includes the following services:

- Access to the purchased conference packages
- Conference documentation

Please contact:

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