



## 2019 Annual Education Seminar

**Wednesday, March 13, 2019**

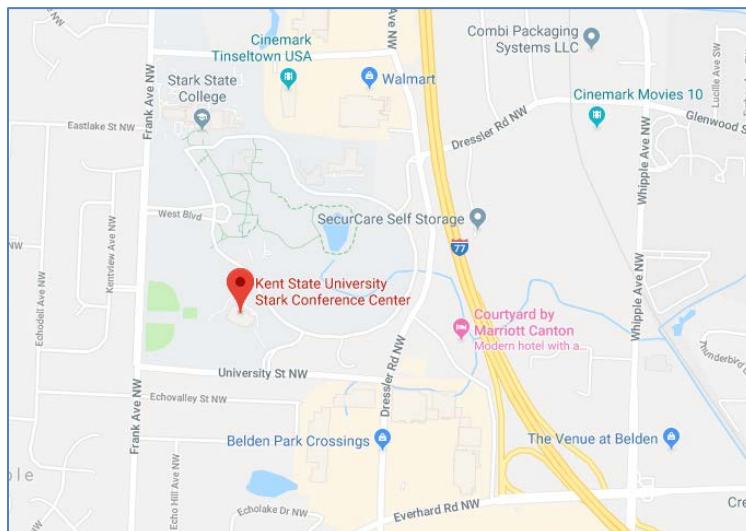
**Advances in Tribology and Lubrication for Vehicle Electrification**

Hosted by:

The Society of Tribologists and Lubrication Engineers  
Canton Section ([www.stlecanton.org](http://www.stlecanton.org))

Location:

Kent State University at Stark – Conference Center  
6000 Frank Avenue NW, North Canton, 44720  
<http://stark.kent.edu/conferencecenter>





**2019 Annual Education Seminar**  
**Wednesday, March 13, 2019 - KSU Stark Conference Center**  
**Advances in Tribology and Lubrication for Vehicle Electrification**

Transmission and driveline products for new electric vehicles are different in many respects from their counterparts in traditional vehicles. This one day seminar organized by STLE's Canton OH Section will provide insight into the advances in tribology and lubrication for vehicle electrification and will focus on the following topics: bearing technology, tire technology, grease and oil technology and energy efficiency testing in an industrial setting.

The topics covered in "Advances in Tribology and Lubrication for Vehicle Electrification" are relevant to the professionals from mechanical engineering and lubricant industries as well as information for our STLE members to stay on the top of. They will discuss how these recent advances affect the performance of mechanical components within the relevant automotive, industrial and lubricant industries.

The topics will be presented by top tier companies experts from Timken, Lubrizol, Shell, Bridgestone & automotive OEM. This Education Seminar will also provide a great opportunity for attendees to get in touch with these and other industry leaders to discuss the issues of prominence in the fields.

All attendees will receive a Tribology Fundamentals Summary (handouts) and a USB flash drive with speaker presentations. Breakfast, lunch and refreshments will be provided.

**Please register as early as you can because seating is limited. See the contacts and fee schedules below.**

<p><b>Date:</b> Mar 13, 2019 (Wed) <b>Time:</b> 7:45 am to 5:00 pm <b>Location:</b> Hoover Seminar room Conference Center Kent State University at Stark 6000 Frank Avenue NW <b>North Canton, OH 44720</b></p> <p><b>Topics that will be covered:</b></p> <ul style="list-style-type: none"><li>• Tribology – Vehicle Electrification<ul style="list-style-type: none"><li>➢ The Tribology of Electric Vehicles</li></ul></li><li>• Bearings - Vehicle Electrification<ul style="list-style-type: none"><li>➢ Driveline and component tribology</li></ul></li><li>• Lubricant technology - Vehicle Electrification<ul style="list-style-type: none"><li>➢ Lubricant Concepts for Electrified Vehicle Transmissions and Axles</li></ul></li><li>• Grease technology - Vehicle Electrification<ul style="list-style-type: none"><li>➢ Impact of EMV on the World of Grease</li></ul></li><li>• Tire Technology - Vehicle Electrification<ul style="list-style-type: none"><li>➢ Tire Tribology Considerations for Vehicle Electrification</li></ul></li><li>• Panel discussions</li></ul> <p><b>STLE Canton Section Committee (2018-19):</b></p> <ul style="list-style-type: none"><li>• Chairperson: John Nussbaumer, Etna Products, Inc.</li><li>• Vice-Chairperson: Tom Triola, The Timken Company</li><li>• Secretary: Jill Myers, The Timken Company</li><li>• Treasurer: Nikhil Londhe, The Timken Company</li><li>• Past Chairperson: Rohit Voothaluru, The Timken Company</li><li>• Past Chairperson: Kuldeep Mistry, The Timken Company</li><li>• Advisor: Peter Drechsler, Proven Solutions Developed LLC</li></ul> <p><b>Education Committee:</b></p> <ul style="list-style-type: none"><li>• Kuldeep Mistry, Rohit Voothaluru and Jill Myers</li></ul>	<p><b>Benefits of Seminar attendance:</b></p> <ol style="list-style-type: none"><li>1. This educational seminars provide exposure to state-of-the-art knowledge and technical information.</li><li>2. This seminar targets all levels of maintenance personnel from the shop floor to the front office, including engineering, research and development, production floor, end users and suppliers.</li><li>3. Brings together managers, engineers, scientists, students, technicians and craftspeople to learn and share "best practices" in the field of lubricant condition monitoring.</li><li>4. Attendance can be applied towards recertification requirements of CLS (Certified Lubrication Specialist) and CLGS (Certified Lubricating Grease Specialist).</li></ol> <p>The fees for the seminar:</p> <ul style="list-style-type: none"><li>• STLE Members - \$175</li><li>• Non-Members - \$199</li><li>• Students - \$100</li></ul> <p><b>Early Bird fees (Registering before Feb 24, 2019)</b></p> <ul style="list-style-type: none"><li>• <b>STLE Members - \$150</b></li><li>• <b>Non-Members - \$175</b></li><li>• <b>Students - \$75</b></li></ul> <p>The fees for the seminar can be paid by:</p> <ul style="list-style-type: none"><li>• Cash or Check</li><li>• Credit Card</li><li>• Online: <a href="http://www.stlecanton.org">www.stlecanton.org</a></li></ul> <p>For additional information, please contact:</p> <ul style="list-style-type: none"><li>• Jill Myers (<a href="mailto:jill.myers@timken.com">jill.myers@timken.com</a>)</li><li>• Tom Triola (<a href="mailto:tom.triola@timken.com">tom.triola@timken.com</a>)</li><li>• Visit <a href="http://www.stlecanton.org">www.stlecanton.org</a></li></ul>
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Photos from previous STLE Canton OH Section's annual Education Seminars

**Seminar Program**

- 8:00 am          Registration & Networking Breakfast
- 8:30 am          Introduction
- 8:30 am          Dr. Edward Becker, STLE President 2007-08 (45 minute presentation and 15 minutes of Q&A)
- The Tribology of Electric Vehicles
- 9:30 am          Mr. Chris Marks, The Timken Company
- Bearings and Lubricants for On-Highway Vehicle Electrification
- 10:30 am        Seminar Group Photo Shoot and Networking break
- 11:00 am        Mr. Kevin Streck, The Lubrizol Corporation
- Lubricant Concepts for Electrified Vehicle Transmissions and Axles
- 12:00 pm        Networking Lunch
- 1:00 pm          Mr. Dwaine (Greg) Morris, Shell Oil Company
- Impact of EMV on the World of Grease
- 2:00 pm          Dr. Nihar Raje, Bridgestone Americas
- Tire Tribology Considerations for Vehicle Electrification
- 3:00 pm          Networking break
- 3:30 pm          Panel discussions with the experts of “Tribology and Lubrication for Vehicle Electrification”.
- 4:30 pm          Meeting closure and Attendance Certificate Distribution

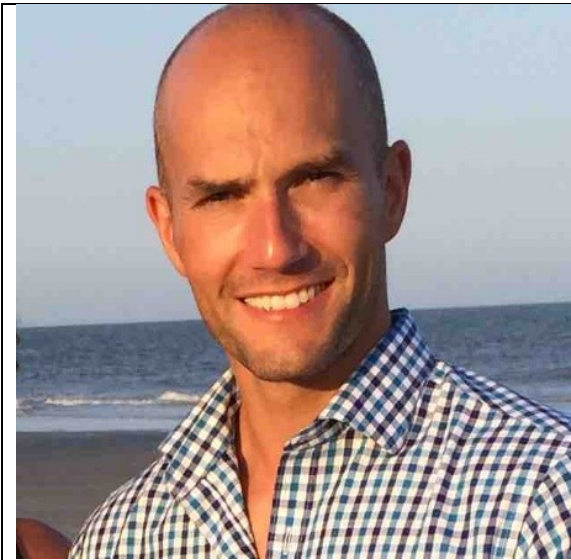
**Dr. Edward Becker, past president STLE, retired from General Motors, The Tribology of Electric Vehicles**



Ed Becker is a past president of The Society of Tribologists and Lubrication Engineers International. He holds a Ph.D. in Mechanical Engineering from the University of Michigan. He retired from General Motors after 30 years of service, mostly in the Powertrain division working on a variety of GM engines and transmissions. Ed then established Friction & Wear Solutions, LLC, which provides advice on materials to solve tribological problems. He holds 12 U.S. patents and is a licensed Professional Engineer in Michigan.

The worldwide demand for automotive transportation remains strong even as the price of conventional fuels fluctuates. Auto companies are committed to providing safe and affordable vehicles which run on whatever energy sources are available in a particular market. A brief history of vehicle propulsion methods will be followed by an update on the current status of electric vehicles, including hybrids, batteries, and fuel cells. The lubrication challenges of electric vehicles will be emphasized.

**Mr. Chris Marks, The Timken Company: Bearing Technology for Vehicle Electrification**

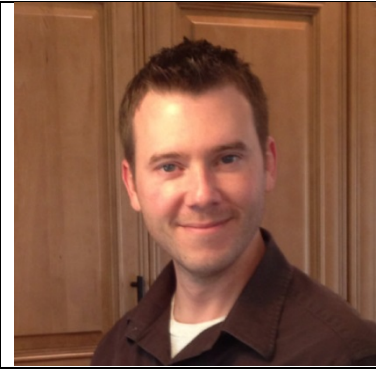


Christopher S. Marks – Sr. Engineering Specialist – for the Timken Company, a world leading manufacturer of bearings and mechanical power transmission products.

In 2001, Chris started his Timken career as a product engineer focused on chassis and wheel end products for the North American heavy truck market. In 2005, Chris transitioned into an application engineering role, supporting various industries including the North American light truck market and global wind energy market. In 2011, Chris transitioned to a management role in R&D focused on advanced modeling and later held a leadership role on a multi-year enterprise level Project Lifecycle Management implementation project. In 2017 he moved into his current role supporting Light Vehicle and Heavy Truck industries with a primary focus on vehicle electrification. Chris Marks earned a bachelor's and master's degree in mechanical engineering from The Ohio State University.

An introduction of bearing concepts will be discussed as a lead-in to the application and use of bearings in electric vehicles. Market trends and key influences such as social, regulatory, and commercial factors are driving the consumer market toward the adoption of electric vehicles. Electric vehicle drivetrain designs vary significantly from one manufacturer to another and the impact of the electrification strategy on a vehicle's architecture highly depends on where an electric motor is integrated into the drivetrain. Consequently, design architecture, integration points, and challenging application drivers will impact bearing selection and the corresponding performance. Timken can offer valuable solutions to this emerging market leveraging technologies in the form of power dense, fuel efficient bearing solutions. Further details will be discussed on this bearing solution and the advantage it offers.

## Mr. Kevin Streck, The Lubrizol Corporation: Lubricant Concepts for Electrified Vehicle Transmissions and Axles



Kevin Streck received his Bachelor's Degree in Mechanical Engineering from the University of Toledo in 1999. Prior to joining Lubrizol, he spent a combined 6 years at Mitsubishi Motors and Hyundai-Kia Motors in Ann Arbor, Michigan. For the past 12 years, Kevin has been with Lubrizol, both in the Mechanical Test lab and, since 2012, in the OEM Group as an Account Manager.

It is anticipated that many future electrified vehicle transmissions and axles will incorporate the electric motor within the unit housing. This will result in direct contact between the motor and the lubricating fluid and raises new concerns regarding the fluid's electrical conductivity, propensity to corrode copper, heat transfer, thermal stability and compatibility with plastics.

The electrical conductivity of the lubricant should be low enough so that the lubricant is a good electrical insulator to minimize leakage current, but also high enough so that it can dissipate static charge. The presence of the motor means that more copper will be exposed to the fluid. Corrosion of the copper in the form of electrical components may be of greater concern than corrosion that may occur when it is in the form of washers, bushings and brazed connections. This implies a need for more sophisticated corrosion testing. The trend toward ever smaller packaging dimensions implies that the heat from the e-motor will lead to higher transmission peak operating temperatures, necessitating the use of higher temperature plastics. The lubricant must be durable in this harsher thermal environment as well as compatible with these new plastics and able to protect them from thermal degradation products. The ability to transfer heat will become a more important factor in lubricant design. All this will pose new challenges to lubricants.

## Mr. Dwaine (Greg) Morris, Shell Oil Company: Impact of EMV on the World of Grease



Dwaine Morris is a Chemist (BS West Virginia University) with over 28 years of industry experience, both in the laboratory and in field technical sales and support. Industry experience includes pharmaceutical research and development scale up, environmental chemistry related to treatment of acid mine drainage, plasma discharge deposition of diamond thin films, and a diverse career within lubricants including formulation chemist and quality control. After joining Shell in 1998, the author has held commercial and technical roles on a local and international level. The previous 12 years have been focused on specialty products including greases. In 2013, the author became a Grease Product Application Specialist for Shell, focusing on Grease applications, field investigation and product validation as part of Shell's Product Technology group. As the Grease Product Application Specialist in the Americas his focus regions include North, Central and South America. In this role, the author links local field sales and technical staff to product development programs within Shell Global Solutions / Product Technology, to bring customers and their industry applications closer to Shell's Research and Development efforts relative to Grease.

The advent of electric vehicles will impact lubricant suppliers globally. The product mix will most likely shift from engine oils to gear or transmission fluids and grease. The most difficult unknown is the application demands for various greases within the vehicle and the impact of the service intervals or the desire for fill-for life products. Further complicating matters is the designs of the various automotive solutions are not being widely shared. The decisions made around product will be driven by emerging ideas with regard to tribology in the bearing contact zone, design expectations on durability of components and greases for the application and market conditions. Global changes in the availability and demand for lithium is changing the landscape of thickeners that have traditionally been used in automotive applications. The combination of factors will drive technology, research and have far reaching impacts for the lubricant and grease manufacturing and marketing community.

## Dr. Nihar Raje, Bridgestone Americas: Tire Tribology Considerations for Vehicle Electrification



Nihar Raje received his Bachelor's degree in Mechanical Engineering from the University of Mumbai, India in 2002 and M.S. and Ph.D. in Mechanical Engineering from Purdue University in 2004 and 2008, respectively. He has been with the Bridgestone Americas Product Development group for the past 10 years, currently working as a Senior Research Engineer at their Americas Technical Center in Akron, OH. He has published over 10 articles in peer reviewed journals and given multiple conference presentations in the areas of Kinematics, Rolling Contact Fatigue and Mechanical Characterization of Rubber. His research interests include Rubber Tribology, Material Characterization and Numerical Modeling of Metals and Elastomers. He currently serves as an associate editor for the journal Tire Science and Technology and on the Industrial Advisory Board of Center for Tire Research (CenTiRe).

Electric vehicles offer certain unique challenges to tire design over their traditional internal combustion engine counterparts due to their increased weight, higher torque, higher fuel economy and lower noise requirements. Since tires are the only medium connecting the vehicle to the ground, they play a critical role in defining the overall performance of the vehicle. The Tribology of tire-ground interaction is paramount in defining the tire (and hence vehicle) performance in terms of tractive force generation, noise generation and wear. This talk will introduce the mechanics of how pneumatic tires transmit forces between the ground and vehicle, discuss the Tribology of tire-ground interaction and how it contributes towards defining tire performance areas of interest to electric vehicle stakeholders. Particular focus items will include: friction, wear, force and noise generation mechanisms in the tire-ground contact patch.

# Engine and Drivetrain Special Program on Electric Vehicles

Don't miss one of the first ever technical sessions on tribology in Electric Vehicles this May, hosted by the STLE Engine and Drivetrain Technical Committee. This all-day session will host 9 presentations from leading experts in the area of Electric Vehicles. Join us on Monday, May 20. [Click here for more details on the presentations for the EV special program.](#)

[Click here for more details on 74th STLE Annual Meeting & Exhibition.](#)

**Session 1C and 2C | Monday, May 20, 2019 |**

**8:00 am - 6:00 pm | Room Legends C**

**Engine and Drivetrain Special Program on Electric Vehicles I**

**8:00 - 8:30 am**

**Efficiency and Emission of EVs in Comparison to IC Engines: A Life Cycle Analysis**

by Ali Erdemir, [Argonne National Laboratory, Lemont, IL](#), Kenneth Holmberg, [VTT Technical Research Centre of Finland, Helsinki, Finland](#)

**8:30 - 9:00 am**

**An Insight into E-Mobility**

by Dean Tomazic, [FEV North America Inc., Auburn Hills, MI](#)

**9:00 - 9:30 am**

**Automotive Fluids for Electrified Vehicles**

by Scott Halley, [The Lubrizol Corp, Wickliffe, OH](#)

**1:30 - 2:00 pm**

**Challenges and Opportunities with Lubricants for HEV/EV Vehicles**

by Arup Gangopadhyay, [Ford Motor Company, Dearborn, MI](#)

**2:00 - 2:30 pm**

**New Challenges for Tribologists and Lubrication Engineers From Vehicle Electrification**

by Chris Shamie, [Schaeffler Group USA, Brighton, MI](#)

**2:30 - 3:00 pm**

**Fuel Economy Testing Using a Prius Engine**

by Peter Lee, Dan Worcester, [Southwest Research Institute, San Antonio, TX](#)

**4:00 - 4:30 pm**

**Newly Developed Lubricants for the Challenges of Electric Drivetrains**

by Tobias Bender, [Fuchs Lubricants Company](#), Wedel, Germany, Thomas Kraft, Gerd Jacobs, Erik Schuster, Rolf Luther, Bernhard Hagemann, Fuchs Schmierstoffe GmbH, Mannheim, Germany

**4:30 - 5:00 pm**

**Challenges and Outlooks for Transmission Fluids in Electric Vehicles**

by Hong Gao, [Shell Global Solutions](#), Houston, TX

**5:00 - 5:30 pm**

**Understanding Base Oils and Lubricants for Electric Drivetrain Applications**

by Yungwan Kwak, Atanu Adhvaryu, Xinggao Fang, Christopher Cleveland, [Afton Chemical Corporation](#), Richmond, VA, Susie Hurley, Afton Chemical Limited, Bracknell, United Kingdom

**5:30 - 6 pm - Open Discussion**

**74th STLE Annual Meeting & Exhibition**

May 19-23, 2019

Omni Nashville Hotel

Nashville, Tennessee (USA)

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