

Brake Colloquium & Exhibition - 41st Annual

Technical Session Schedule

As of November 18, 19:40:18 PM

Sunday, November 12

Tutorial: EURO-7 Standards: Reducing Road Transport Emissions Beyond Exhaust

Session Code BC600

Room Cibolo 6-7 Session 4:00 p.m.

Euro 7 is much more than an update to the limits from Euro 6. Euro 7 aims at a broad perspective of changes to ensure cleaner vehicles, improve air quality, and protect the health of EU citizens and the environment. To accomplish that, Euro 7 plans to include new brake emissions and microplastic regulations from tires, extend and make the different emissions tests more effective, migrate to digital compliance monitoring, and better market surveillance. Euro 7 establishes fuel- and technology-neutral emission limits, add pollutants, and defines a broader range of driving conditions for on-road tests. These apply to all cars, vans, trucks, and buses with internal combustion engines, electric, and plugin hybrid vehicles. This tutorial breaks down complex topics into three perspectives (independent research, vehicle manufacturing and homologation, and third-party services and testing systems). The tutorial dives into a) significant elements of the Euro 7, b) the requirements and why they were defined in such a way, c) what they mean for the vehicle value and supply chain, and d) the testing methods and systems, with emphasis on non-exhaust emissions. This is a must-attend tutorial for those interested or working towards complying with the upcoming Euro 7 limits. Learn more about the Participants

Organizers - Carlos Agudelo, Link Engineering Co.; Georg Ostermeyer, SiDyS GmbH; Matthew Robere, HL Mando; Imad Khalek, Southwest Research Institute

Presenters - Carlos Agudelo, Link Engineering Co.; Imad Khalek, Southwest Research Institute; Matthew Robere, HL Mando

Monday, November 13

Panel Discussion: Brake Standards

Session Code BC124

Room Cibolo 1-5 Session 1:00 p.m.

This panel discussion will provide an update on the most critical brake related standards work being developed via Committee in the areas of NVH, Linings, Hydraulics, fluids, steering and dynamometer in light and heavy-duty vehicles through a series of pre-seeded questions. There will then be the opportunity for the audience to engage in a Q& A period to address those issues around standards development that is of utmost criticality to for you to hear discussed. PLEASE NOTE: Each Panelist have provided a more detailed pre-recorded presentation giving a review on the current work being done by the respective committee groups. Learn more about the Participants Panelists were given the opportunity to provide a recorded presentation detailing their Standards activities to allow for more detailed panel conversations on the value and benefits of standards in Brake Development. Recorded Presentations are on the App

Organizers - Maria Cristina Casimiro Garcia, Link Engineering Co.

Moderators - Maria Cristina Casimiro Garcia, Link Engineering Co.

Panelists - Carlos Agudelo, Link Engineering Co.; Eric Denys, Meneta North America; Saikiran Divakaruni, ZF Friedrichshafen AG; Dave Engelbert, Haldex; Chuck Greening, Greening Inc.; Mark Riefe, General Motors LLC;

Monday, November 13

Brake Mechatronics and Controls Products

Session Code BC131

Room Cibolo 1-5 Session 3:20 p.m.

The combination of electro-hydraulic/electro-mechanical actuators and software controls - are used to provide a wide range of functions in the brake system, including wheel slip control, electronic parking brake functions, and blending for regenerative braking. The use of mechatronics to provide brake boost has been greatly expanded in recent years, and they are relied upon to support many Advanced Driver Assist System features, such as adaptive cruise control and many active safety features. This session is intended to provide forum for a wide range of topics in the area of mechatronics – electric boost, calipers, parking brakes, slip control, control algorithms, and new actuator concepts, including advanced development tools and processes for these products as the requirements are significantly changed to pure mechanical products.

Organizers - David Antanaitis, General Motors LLC; Jaeseung Cheon, MOBIS; James Fash, Zox Inc.; Joachim Noack, ZF Active Safety GmbH

Chairperson - David Antanaitis, General Motors LLC

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Time	Paper No.	Title
3:20 p.m.	ORAL ONLY	Brake Pedal Feel - An Optimization Approach of a Brake Pedal Simulator System by means of Software Calibration Cristian Malmassari, Brembo Spa
3:40 p.m.	2023-01-1865	A Renewed Look at Centralized vs. Decentralized Actuation for Braking Systems David Antanaitis, General Motors LLC
4:00 p.m.	2023-01-1866	Brake Control Allocation Employing Vehicle Motion Feedback for Four-Wheel-Independent-Drive Vehicle David Vošahlík, Tomáš Veselý, Tomas Hanis, Czech Technical University in Prague; Jaroslav Pekar, Garrett Motion
4:20 p.m.	2023-01-1867	Standalone Hill Drive Away Assist Sudha Ramani, Sriram Ramani, Ramthilak Balasubramaniam, Brakes India Private Limited
4:40 p.m.	2023-01-1864	Electro-Hydraulic Composite Braking Control Optimization for Front-Wheel-Driven Electric Vehicles Equipped with Integrated Electro-Hydraulic Braking System Xinyu Zhao, Lu Xiong, Guirong Zhuo, Tongji University; Qiang Shu, Xuanbai Zhao, Shanghai Tongyu Automotive Technology

The papers in this session are available in SAE Technical Paper Collection, COLL-TP-00707, and also

Monday, November 13

Opening Keynote - Graham Conway

Session Code BCKN1

Room Cibolo 6-7 Session 8:30 a.m.

[Learn more about the Participants](#)

Keynote Speakers Graham Conway, Southwest Research Institute

Monday, November 13

Panel Discussion: Voice of the OEM

Session Code BC123

Room Cibolo 6-7 Session 10:15 a.m.

The panel is an opportunity for the audience to hear the lead individuals on brake development from 4-6 OEMs having a conversation on current and future brake development for vehicles with ICE and/ or Battery Electric propulsion systems. We propose only to 2 questions to the panelists and then open it up for questions from the audience. [Learn more about the Participants](#)

Organizers - Richard Kaatz, KB AutoSys Co., Ltd.; Chris McCormick, ZF Group

Moderators - Richard Kaatz, KB AutoSys Co., Ltd.; Chris McCormick, ZF Group

Panelists - Patrick Caherty, Formerly -Lordstown Motor Corporation; Sebastian Gramstat, Audi AG; Toru Matsushima, Toyota Motor Corp.; Mark Riefe, General Motors LLC;

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Monday, November 13

Fundamental Mechanisms of Friction and Vibration

Session Code BC110

Room Cibolo 6-7 Session 1:00 p.m.

The session focuses on the fundamentals of the interaction on the sliding surface and associated friction induced vibrations. From nanoscale interactions of the contacts on the sliding interface to macroscopic methodology to diminish friction induced vibrations, this session comprises new findings and discussion toward a step forward to full understanding of the friction and brake induced vibration.

Organizers - Harald Abendroth, Retired; Ho Jang, Korea Univ.; Heewook Lee, General Motors LLC

Chairperson - Weiming Liu, Tenneco

Time	Paper No.	Title
1:00 p.m.	ORAL ONLY	Prediction of friction instability based on the velocity-dependent third body layer on the pad surface Ho Jang, Korea Univ.
1:20 p.m.	2023-01-1862	Effect of Moisture Adsorption on Low-Speed and Moderate-Speed Braking: Effect on In-Stop Friction Coefficient and Low Frequency Noise Meechai Sriwiboon, Saiprasit Koetnuyom, King Mongkut's University of Technology North Bangkok; Seong Kwan Rhee, SKR Consulting Inc.; Jitrathep Sukultanasorn, Kritsana Kaewlob, Jitpanu Kunthong, Compact International (1994) Co., Ltd.
1:40 p.m.	2023-01-1863	Brake Pad Moisture Adsorption and Its Effect on Brake Pad Compression Strain/Modulus and Friction Coefficient: Effect of Pad Cure Temperatures Seong Kwan Rhee, SKR Consulting LLC; Aman Rathee, Shiv Raj Singh, Devendra Kumar Sharma, ASK Automotive Ltd.
2:00 p.m.	ORAL ONLY	Quench Hardening Effect of Gray Iron Brake Discs on Brake Emissions Hyungjo Seo, Ho Jang, Korea Univ
2:20 p.m.	ORAL ONLY	Understanding friction performance in hybrid braking: The role of rotor geometry Sai Krishna Kancharla, Southern Illinois Univ at Carbondale; Peter Filip, Southern Illinois Univ. at Carbondale

Monday, November 13

Improving Brake NVH (Noise, Vibration and Harshness) Performance

Session Code BC101

Room Cibolo 6-7 Session 3:20 p.m.

This session focuses on innovations for improving brake NVH (Noise, Vibration and Harshness) performance. Papers and presentations involving new methods, theories, techniques, and application examples are welcome.

Organizers - Eric Denys, Meneta North America; Weiming Liu, Tenneco; Brent Lowe, General Motors LLC

Chairperson - Weiming Liu, Tenneco; Eric Denys, Meneta North America

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Time	Paper No.	Title
3:20 p.m.	2023-01-1869	Sound Source Identification of In-Plane Squeal of Disc Brakes Using Array Microphones and Its Verification by Acoustic Simulation Shuhei Tanamachi, Nisshinbo Brake Inc.; Tom Millsap, Nisshinbo Automotive Manufacturing Inc.; Yoshiyuki Yamaguchi, Nisshinbo Brake Inc.
3:40 p.m.	ORAL ONLY	An Experimental Approach to the Effect of Friction Characteristics of FNC Disc and Friction Materials on the Crunch Noise Sang Woon Cho, Sangsin Brake Co.; Jin Sung Jang, Sangsin Brake Co; Sanghun Sung, SungWoo Choi, Ji Hun PARK, Sung Hyeon son, Sangsin Brake Co.
4:00 p.m.	ORAL ONLY	Automotive Brake System and Chassis Integration Impacts on Low-Frequency Brake Noise Mark Riefe, General Motors
4:20 p.m.	ORAL ONLY	Real world applications of the Meneta Virtual dyno™ Halewijn Stikvoort, Meneta Advanced Shim Technology A/S; Eric Denys, Meneta North America

The papers in this session are available in SAE Technical Paper Collection, COLL-TP-00707, and also

Tuesday, November 14

Student Poster Competition

Session Code BC500

Room Cibolo 1-5

Session 7:30 a.m.

Organizers - Bart Cann, BWI Group

Time	Paper No.	Title
7:30 a.m.	ORAL ONLY	ZEDS - Zero Emission Driving System: Electric Motor with Magneto-rheological Braking Integration Henrique de Carvalho Pinheiro, Politecnico di Torino
7:45 a.m.	ORAL ONLY	Designing a Brakes System for Formula SAE Gautam Vachaspati; Liam James Wangnick, Maximo D. Torres Rangel, Univ. of Texas-Austin
8:00 a.m.	ORAL ONLY	Enhancing Vehicle Braking Simulation Accuracy Sai Krishna Kancharla, Southern Illinois Univ. at Carbondale

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Tuesday, November 14

Critical Issues Related to the Performance and Safety of Commercial Vehicles and Racing Brake Applications

Session Code BC125

Room Cibolo 1-5 Session 10:20 a.m.

This combined session will feature international experts addressing critical braking issues related to the performance and safety of commercial vehicles and racing brake applications.

Organizers - Chuck Greening, Greening Inc.; Roy Link, Link Engineering Co.; Michael O'neil, Essex Parts Services Inc.; Jon Leon Washington, General Motors LLC; Robert Gardner, Meritor Inc

Chairperson - Robert Gardner, Meritor Inc

Time	Paper No.	Title
10:20 a.m.	2023-01-1873	IMU Based Velocity Estimation Impact on Stopping Distance for Heavy-Duty Class 8 Truck Air Brake Systems with ABS Tamas Erdos, Peterbilt Motors Company
10:40 a.m.	ORAL ONLY	Race to Road Project Philosophy Michele Vianello, Stephen Leonard Hood, AP Racing
11:00 a.m.	ORAL ONLY	Changing Expectations of the OE and Brake Products for the Track Day Enthusiast Michael O'neil, Essex Parts Services Inc.
11:20 a.m.	ORAL ONLY	Euro 7 Impact on CV in North America Robert Francis Gardner, Meritor Inc.

The papers in this session are available in SAE Technical Paper Collection, COLL-TP-00707, and also

Tuesday, November 14

Advances in Brake Component and Brake System Design Part 1

Session Code BC105

Room Cibolo 1-5 Session 1:00 p.m.

The session focuses on innovations with foundation brake and apply system components (calipers, rotors, drums, bearings, manual and electric park brakes, and actuation). It addresses integration at all levels (pad to caliper, caliper to corner, corner and actuation to vehicle). Examples include but are not limited to: component design, performance enhancements, system sizing/configuration, drag reduction, pedal feel, mass reduction, and thermal management by new designs/innovative materials.

Organizers - Saikiran Divakaruni, ZF Friedrichshafen AG; Chris McCormick, ZF Group; Jeff Pontius, Mando America Corporation; Mark Riefe, General Motors LLC

Chairperson - Chris McCormick, ZF Group; Mark Riefe, General Motors LLC; Saikiran Divakaruni, ZF Friedrichshafen AG

Time	Paper No.	Title
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Time	Paper No.	Title
1:00 p.m.	ORAL ONLY	Centralized vs. Decentralized Brake Systems Richard Nesbitt, Grace Y, Bosch
1:20 p.m.	2023-01-1879	A Study on Development of Brake System Using 1-D Simulation Ji Ho Yoo, Sang Mok Lee, Si Woo Park, Jae Hoon PI, Changhoe Koo, Byeung Jin Choi, Hoon Yeo, Hyundai Mobis
1:40 p.m.	ORAL ONLY	Solving the Complexity Code: Vehicle Motion Management Richard Nesbitt, Grace Y, Bosch
2:00 p.m.	ORAL ONLY	Brake System Design using Regenerative Brake for xEV Yuichiro Inada, ADVICS Co., Ltd.
2:20 p.m.	ORAL ONLY	New HMI Concepts for Brake-by-Wire Systems Richard Nesbitt, Grace Yoon, Bosch

Tuesday, November 14

Advances in Brake Component and Brake System Design Part 2

Session Code BC105

Room Cibolo 1-5

Session

3:20 p.m.

Organizers - Saikiran Divakaruni, ZF Friedrichshafen AG; Chris McCormick, ZF Group; Jeff Pontius, Mando America Corporation; Mark Riefe

Time	Paper No.	Title
3:20 p.m.	2023-01-1878	Some Considerations for Brake-Based Park Systems, Including Residual Drag Impact David Antanaitis, Maria Richelle Harris, Kevin Connor, Mark Riefe, General Motors, LLC
3:40 p.m.	ORAL ONLY	Braking the Mechanical Connection Karthik Devaraj, HELLA
4:00 p.m.	ORAL ONLY	Development of Monoblock Caliper EPB Hyun Hwa Hong, Hyundai Mobis
4:20 p.m.	ORAL ONLY	Thermal Performance of Corroded Brake Rotors

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Time	Paper No.	Title
		Sundara Raman Rajaraman, Srikanth Venkatesan, Balaji Chinniah, Brakes India Private, Ltd.
4:40 p.m.	ORAL ONLY	Development of 2-Piston Electric Parking Brake (2P MOC)
		Moojin Choi, MOBIS

Tuesday, November 14

Panel Discussion: EURO-7 Standards: Strategy and Impacts on Vehicle Design, Validation, Homologation, and Supply Chain Management

Session Code BC300

Room Cibolo 6-7

Session

8:30 a.m.

The Euro 7 standards and rules will impact multiple supply chains operating in the Europe Community. Companies selling vehicles, systems, or components related to the powertrain (from the primary propulsion system to the tires) for all vehicle categories operating in the European Community roads must develop, redesign, or reinvent several tasks and workflows before bringing their vehicles to the dealership. The migration involves making many decisions quickly (some due by 2025). Some companies will decide to accelerate the migration to hybrid or electric vehicles. Their competitors may migrate to different suppliers, and others could use new friction materials or add unique treatments to their brake discs. Regardless, most will need to navigate the new homologation processes for new exhaust pollutants; meet new requirements for extended periods; homologate their brakes and tires to new methods and requirements; and validate legacy requirements for performance, durability, and NVH. This panel brings several experts from the industry and their perspectives, challenges, and new ways of approaching certain aspects of vehicle and component design, validation, and homologation, while meeting the business metrics and complying with the new environmental rules from Euro 7. The panelists include stakeholders with different perspectives and backgrounds, all relevant and valuable to give you insights to develop and align your strategies and implementation plans. Learn more about the Participants

Organizers - Carlos Agudelo, Link Engineering Co.; Matthew Robere, HL Mando

Moderators - Georg Ostermeyer, SiDyS GmbH

Panelists - Sebastian Gramstat, Audi AG; Tim Kasten, Stellantis NV; Imad Khalek, Southwest Research Institute; Mara Leonardi PhD, Brembo SPA; Seungju Yoon, California Air Resources Board; Agusti Sin, ITT Friction Technologies;

Tuesday, November 14

Brake Emissions Measurement and Characterization Part 1

Session Code BC122

Room Cibolo 6-7

Session

10:20 a.m.

Braking emissions are becoming more and more the focus of the public. Fundamental questions of the quantitative detection of brake dust and its distribution in the environment, health questions are essential. This session addresses measurement technology, theory and simulation for brake emission and ways to minimize the environmental impact.

Organizers - Carlos Agudelo, Link Engineering Co.; Imad Khalek, Southwest Research Institute; Georg Ostermeyer, TU Braunschweig; Matthew Robere, General Motors LLC

Chairperson - Imad Khalek, Southwest Research Institute; Matthew Robere, HL Mando

Time	Paper No.	Title
10:20 a.m.	2023-01-1876	Brake Emission Testing Process – Assuring Repeatability and Reproducibility of Emission Measurement Results

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Time	Paper No.	Title
		Christoph Weidinger, Sampsa Martikainen, Christian Wanek-Ruediger, Michael Huber, Andreas Rainer, AVL LIST GmbH
10:40 a.m.	ORAL ONLY	Analysis of Interlaboratory Study on Brake Emissions Measurements Applying ISO 5725 Statistical Methods Carlos Agudelo, Link Engineering Co.
11:00 a.m.	2023-01-1877	Reproducibility of Physico-Chemical Properties in Brakes Emissions Generated at Different Dynamometric Benches Alessandro Mancini, Bozhena Tsyupa, Pietro Della Bella, Simone Russo, Elia Martinelli, Mara Leonardi, Stefano Belotti, Brembo Spa; Maximilian Hense, Hartmut Niemann, LINK Engineering Company GmbH; Federico Bertasi, Andrea Bonfanti, Brembo Spa
11:30 p.m.	ORAL ONLY	On Modelling of Representative Fraction Sampling of Solid Brake Wear Particles Emitted During Full-Scale Brake Dynamometer (Pre-Recorded Presentation Only-Available on App) Peter Filip, Southern Illinois Univ. at Carbondale

Tuesday, November 14

Brake Emissions Measurement and Characterization Part 2

Session Code BC122

Room Cibolo 6-7

Session 1:00 p.m.

Organizers - Carlos Agudelo, Link Engineering Co.; Imad Khalek, Southwest Research Institute; Georg Ostermeyer, SiDyS GmbH; Matthew Robere, General Motors LLC

Chairperson - Imad Khalek, Southwest Research Institute; Matthew Robere, HL Mando

Time	Paper No.	Title
1:00 p.m.	ORAL ONLY	Effects of Titanate on Brake Wear Particle Emission - Part 2 Emiko Daimon, Otsuka Chemical Co., Ltd.
1:20 p.m.	ORAL ONLY	Development of Dynamometer Driving Cycles for Brake Emission Measurements on City Busses within the AeroSofld Project Marco Zessinger, Hartmut Niemann, Link Engineering Co.; Carlos Agudelo, Link Engineering Co; Christof Asbach, IUTA e. V.; Martin Lehmann, MANN+HUMMEL GmbH
1:40 p.m.	2023-01-1875	Characterizing a Real-Driving Brake Emissions Sampling System on a Laboratory Test Bed Michael Peter Huber, Peter Fischer, Graz University of Technology; Johannes Murg, Herbert Reingruber, Christian Wanek-Ruediger, Christoph Weidinger, Gerald Steiner, AVL List GmbH
2:00 p.m.	ORAL ONLY	Application of ISO Standards to Assess Capability and Performance During Dynamometer Brake Emissions Testing per UN GTR 24 Carlos Agudelo, Link Engineering Co.

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Time	Paper No.	Title
2:20 p.m.	2023-01-1861	Dynamometric Investigation on Airborne Particulate Matter from Brake of Automobile: Impact of Disc Materials on Brake Emission Factor Mu Hyeok Jeong Ing, KICET; Jungju Lee, SungWoo Choi, Sanghun Sung, Sangsin Brake Co.; Jong-Young Kim, Yoonsuk Oh, Jae-Hwan Pee, KICET

Tuesday, November 14

Impact of AI on Braking

Session Code BC201

Room Cibolo 6-7 Session 3:20 p.m.

This session is seeking abstracts on how AI is impacting brake testing, materials selection and emissions. If you have case-studies on Fundamentals or use in land, sea and air mobility

Organizers - Carlos Agudelo, Link Engineering Co.; Saikiran Divakaruni, ZF Friedrichshafen AG; Heewook Lee, General Motors LLC; Georg Ostermeyer, SiDyS GmbH

Chairperson - Saikiran Divakaruni, ZF Friedrichshafen AG; Carlos Agudelo, Link Engineering Co

Time	Paper No.	Title
3:20 p.m.	2023-01-1882	Shim Bond Coverage Analysis Using Artificial Intelligence Saikiran Divakaruni, ZF Friedrichshafen AG; Austin Habegger, Zf Active Safety US Inc.; Peter Chew, ZF Group; Priyanka Shaha, Akshayaasri Sridharan, Zf Active Safety US Inc.
3:40 p.m.	ORAL ONLY	Intelligent Brake System: Using AI to Optimize Friction, Hybrid, and Regenerative Braking in Electric Vehicles Peter Filip, Southern Illinois Univ. at Carbondale
4:00 p.m.	Panel	Panel Discussion: Impact of AI on Braking Learn more about the Participants Moderators - Carlos Agudelo, Link Engineering Co. Panelists - David Antanaitis, General Motors LLC; Saikiran Divakaruni, ZF Friedrichshafen AG; Pietro Durando, ITT Friction Technologies; Yasuyuki Kozawa, Nisshinbo Automotive Mfg; Parimal B. Mody, P. MODY Consulting.;
11:30 p.m.	ORAL ONLY	Use of Artificial Intelligence in Nondestructive and Performance Evaluation of Friction Materials (Pre-Recorded Presentation Only- Available on Event App) Sai Krishna Kancharla, Southern Illinois Univ at Carbondale; Peter Filip, Southern Illinois Univ. at Carbondale

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Wednesday, November 15

Latest Advancement in Simulation Technologies View

Session Code BC104

Room Cibolo 1-5 Session 8:45 a.m.

This session focuses on simulation that has been extensively used to reduce the product development time as well as prevent the field issues such as the brake noise and vibration. Presentations include the latest in the computer-aided engineering technologies in the various areas including but not limited to NVH, CFD, thermal, structural, and wear analysis.

Organizers - Heewook Lee, General Motors LLC; Kwangjin (Mike) Lee, Sangsin Brake America; Joachim Noack, ZF Active Safety GmbH

Chairperson - Kwangjin (Mike) Lee, General Motors LLC

Time	Paper No.	Title
8:45 a.m.	2023-01-1884	Brake Squeal – Digital Twinning of a Brake Dynamometer Ramana Kappagantu, Siemens Digital Industries Software
9:05 a.m.	2023-01-1885	Developing EPB Analytic Model Based on Multi-Flexible Body Dynamics Yongsik Kwon, Chang Hun Park, Joon Hee Yun, Hyundai Mobis; Park Jing Moon, Function Bay
9:25 a.m.	ORAL ONLY	Brake Creep Groan Modeling by Implicit Time Domain Analysis Weiming Liu
9:45 a.m.	ORAL ONLY	Virtual methods for Braking System Vehicle Controls Development, Calibration and Validation Fabio Carbone, Luca D'Avico, Lucas Baudry, Brembo

Wednesday, November 15

Advances in Brake Component and Brake System Design Part 3

Session Code BC105

Room Cibolo 1-5 Session 10:20 a.m.

Organizers - Saikiran Divakaruni, ZF Friedrichshafen AG; Chris McCormick, ZF Group; Jeff Pontius, Mando America Corporation; Mark Riefe

Time	Paper No.	Title
10:20 a.m.	ORAL ONLY	Sustainable and High-Performing Cast Iron Brake Corrosion Protection Finishing Björn O. Dingwerth, MacDermid Enthone Industrial Solutions

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Time	Paper No.	Title
10:40 a.m.	2023-01-1880	Influence of Iron and Manganese on the Mechanical Properties and Microstructure of a Recycled EN AC-43200 Aluminium-Silicon Alloy Arianna Pavesi, Daniele Casari, Alessandro Mancini, Andrea Bonfanti, Brembo S.p.A.; Silvia Barella, Fabrizio D'Errico, Politecnico di Milano; Federico Bertasi, Brembo S.p.A.
11:00 a.m.	2023-01-1888	Applying Ferritic Nitrocarburizing (FNC) in Conjunction with Smart ONC® on GCI Brake Rotors: The New Generation of FNC Rotors to Meet the Euro 7 Standards Saadia Nousir, Karl-Michael Winter, Nitrex Metal Inc.
11:20 a.m.	ORAL ONLY	Anodizing of Aluminum Cast Brakes to Achieve Superior Aesthetics and Corrosion Performance Sascha Wegner, MacDermid Enthone Ind. Solutions
11:40 a.m.	ORAL ONLY	Niobium alloyed Ferritic Nitrocarburized Brake Rotors Mike Holly, Mike Holly Metals LLC

Wednesday, November 15

Developments and Innovations in Friction Materials and Friction Couples

Session Code BC100

Room Cibolo 1-5

Session

1:00 p.m.

Recent discoveries and innovations in friction materials development are the session's focus. Presentations address paradigm shift expected in the future due to onset of vehicles with regenerative braking and related changes in performance of friction brakes. including the pad and rotor microstructure, chemistry and properties, surface treatments, environmentally aspects, and intrinsic physical property measurements.

Organizers - Peter Filip, Southern Illinois Univ. at Carbondale; Cara Learman, General Motors LLC; Toshikazu Okamura, KIRIU Corp.; Adnan Sarfraz, LAPINUS

Chairperson - Adnan Sarfraz, LAPINUS

Time	Paper No.	Title
1:00 p.m.	ORAL ONLY	Laser-Based Rotor Coating Optimization for a Sustainable and Cost-Efficient Introduction in OE Series Tobias Phillip Utsch
1:20 p.m.	ORAL ONLY	Wear, Friction Properties and NVH: The Potential of Lapinus Mineral Fibres in Brake Pads with Coated Rotors Adnan Sarfraz, LAPINUS
1:40 p.m.	ORAL ONLY	Mixed Metal Sulfide FeS-ZnS as New Cost-Efficient Friction Additive: Tribotecc SLX 131 Lars Hensgen, John Abado, Tribotecc GmbH

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Time	Paper No.	Title
2:00 p.m.	2023-01-1889	Experimental Investigation of Tribochemical Processes in Frictional Contacts Using a Pin-on-Disk Tribometer Chengyuan Fang, Georg-Peter Ostermeyer, Frank Schiefer, Carsten Schilde, Christina Lehmann, Günter Bräuer, TU Braunschweig
2:20 p.m.	ORAL ONLY	Investigation of the Influence of Tribochemical Processes on Boundary Layer Dynamics in Tribological High-Load Contacts Christina Lehmann, TU Braunschweig
2:40 p.m.	ORAL ONLY	Green Resilient Friction Modifiers Henrique de Lima Secco, Rijo Jacob Robin, Superior Graphite

Wednesday, November 15

Wrap Up 2023 and Closing

Session Code BCK5

Room Cibolo 6-7 Session 8:30 a.m.

Members of the Technical Advisory Group will share their thoughts on 2023.

Wednesday, November 15

Innovations in Wheel Bearing and Seals and Their Impact on Brake Corners Part 1

Session Code BC120

Room Cibolo 6-7 Session 8:45 a.m.

This session will focus on innovations in wheel bearings and their integration to the vehicle. Individual presentations will address topics such as mass optimization, drag reduction, enterprise cost, warranty reduction, Brinelling, sealing, corner splash protection, lateral stiffness, lubrication, validation, coatings and new technology.

Organizers - Kelly Grubaugh, Richard Haehn, ILJIN USA Corporation; Keith Sharp, JTEKT; Robert Sutherlin, ILJIN USA Corporation

Chairperson - Keith Sharp, JTEKT; Robert Sutherlin, ILJIN USA Corporation

Time	Paper No.	Title
8:45 a.m.	2023-01-1886	Reliability-Based Design Optimization for Automotive Wheel Bearings Considering Geometric Uncertainty Seungpyo Lee, ILJIN USA Corporation
9:05 a.m.	ORAL ONLY	Sustainable Grease Solution for Heavy Duty Trailer Axle Wheel End Hub Application Anuj Mistry, Matthias Ostertag, Fuchs Lubricants Co.

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Time	Paper No.	Title
9:25 a.m.	ORAL ONLY	New Wheel Bearing Technologies for Axial Compactness and Weight Reduction Rob Barrett, NTN Toyo Bearing Co., Ltd.
9:45 a.m.	ORAL ONLY	Design Methodologies for Power Dense Wheel Bearing Solutions Mikayla Aowad, The Timken Company

Wednesday, November 15

Innovations in Wheel Bearing and Seals and Their Impact on Brake Corners Part 2

Session Code BC120

Room Cibolo 6-7

Session 10:20 a.m.

Organizers - Kelly Grubaugh, Iljin USA; Keith Sharp, JTEKT; Robert Sutherlin, ILJIN USA Corporation

Chairperson - Robert Sutherlin, ILJIN USA Corporation; Keith Sharp, JTEKT

Time	Paper No.	Title
10:20 a.m.	2023-01-1887	The Effects of the Wheel Bearing and Mating Parts to Rotor Runout and Runout Variation Hyungdoo Hwang, Paul Kuehl, Robert Sutherlin, Kelly Grubaugh, ILJIN USA Corporation
10:40 a.m.	Panel	Panel Discussion: What's Next for Hub Unit Technology As the evolution of electric vehicles (EV's) kicks into overdrive, the automotive market for EV's is exploding with new battery technologies, integrating artificial intelligence in EV's and an increase in EV market share across the globe. With advancements to many of the powertrain/driveline components to support this growing propulsion system such as e-axles and wheel motors, the obvious question for wheel bearings is "what's next". This wheel bearing panel will explore the general options that hub unit technology will have to advance the output of the EV market with topics such as: industry standards for validation and torque reporting, the most beneficial next step in hub unit generational development (integrated wheel motors or CVJs) and hub unit compatibility with the autonomous EV market. Learn more about the Participants

Moderators - Richard Haehn, ILJIN USA Corporation

Panelists - Mikayla Aowad, The Timken Company; Rob Barrett, NTN Toyo Bearing Co., Ltd.; Kelly Grubaugh, Iljin USA; Paul Kuehl, FCA US LLC; David Rybski, SKF USA Inc.; Keith Sharp, Koyo Bearings of North America (JTEKT);

Brake Colloquium & Exhibition - 41st Annual

Technical Session Schedule

As of November 18, 19:40:20 PM

Wednesday, November 15

Testing and Measurement Methods for New Braking Technologies

Session Code BC103

Room Cibolo 6-7 Session 1:00 p.m.

Session focuses on new laboratory and testing methods and systems for new braking technologies with presentations on electrification of braking systems, powertrain electrification and its interaction with the foundation brakes, physical validation of simulation models, and hardware-in-the-loop testing in order to discuss, and charter the path forward on testing activities, measurement methodologies, and challenges.

Organizers - Jeffrey Gist, General Motors; Euichan Hwang, MOBIS; Adam Link, Link Engineering Co.

Time	Paper No.	Title
1:00 p.m.	2023-01-1892	Simulated LACT Procedure for Predicting Lining Life for Vehicles with Regenerative Braking Wael Jayyousi, Saikiran Divakaruni, Zf Active Safety Us Inc.
1:20 p.m.	2023-01-1891	Using the XiL Approach for Brake Emission Investigations for Electrified Vehicles Sebastian Gramstat, Elizaveta Gramstat, Audi AG; Maximilian Hense, Marco Zessinger, Link Engineering GmbH
1:40 p.m.	ORAL ONLY	ViBES - An Innovative AI-based Monitoring System for Vibrating Test Bench Cristian Malmassari, Brembo Spa
2:00 p.m.	ORAL ONLY	Updates of Brake Squeal Laboratory Testing for Passenger Cars (SAE J2521) and Commercial Vehicles with Air Brakes (SAE J3213) Alejandro Hortet, Link Engineering
2:20 p.m.	2023-01-1890	Engineering Properties of Drum Brake Friction Materials Donald Yuhas, Carol Vorres, Loretta Oleksak, Industrial Measurement Systems Inc.; Saikiran Divakaruni, ZF Friedrichshafen AG; Vijay Subramanian, Alroko GmbH & Co KG

The papers in this session are available in SAE Technical Paper Collection, COLL-TP-00707, and also