



EuroBrake® 2019

21 - 23 May, International Congress Center,
Dresden, Germany

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conference & exhibition
Preliminary Programme & Exhibitor Directory

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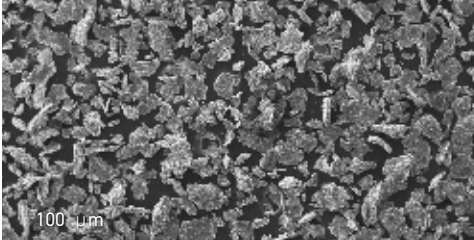


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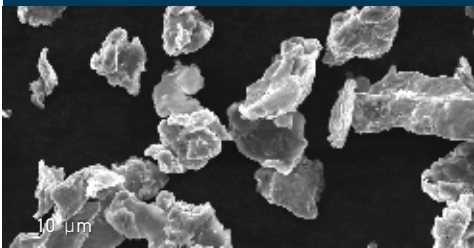


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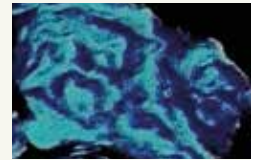
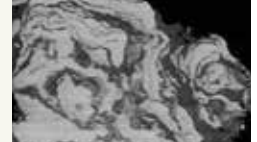


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Welcome to EuroBrake 2019 in Dresden



You are invited to the eighth annual EuroBrake conference and exhibition - the world's largest event in braking technology. EuroBrake plays an important role within the global braking technology and friction industry so our high-quality Technical Programme is crucial to those involved in this vital area of engineering.

We are delighted to be returning to the International Congress Center in Dresden, Germany for 2019 - a state of the art conference centre located in the city's old town on the bank of the River Elbe. Dresden is home to many high-tech companies in sectors including semiconductors and aerospace and is one of Germany's foremost research locations - the ideal location for EuroBrake 2019.

EuroBrake was established in 2012 and has since grown significantly, attended by more than 1,100 delegates in 2018, offering an important Technical Programme of 140 technical presentations and featuring 100 international organisations within the exhibition. EuroBrake attracts a global audience of engineers, scientists, academics and executives from the industries of passenger car, commercial vehicle, rail and the wider industrial sectors.

EuroBrake 2019 offers a wonderful agenda, featuring sessions on brake control systems, the environment and advanced disc coatings, while we dedicate a Panel Discussion on the topic of lifelong brakes. Following a successful introduction last year, a selection of sessions are specifically dedicated to rail braking technology. Our international exhibition is almost full and will feature 100 organisations, who represent the entire value chain from leading industry players to new entrants - it's a great opportunity to meet new suppliers.

We are delighted to announce that the EuroBrake Student Opportunities Programme returns to EuroBrake 2019, offering 50 students the chance to attend via sponsorship. Many thanks to our current sponsors, who have already confirmed their support - we still have some exciting sponsorship opportunities, so please do contact us to gain some valuable brand visibility for your organisation.

We hope you can join us in Dresden for what is sure to be a fantastic EuroBrake 2019 - we look forward to seeing you there!



Harald Abendroth

Harald Abendroth
Chairman, EuroBrake 2019



Chris Mason

Chris Mason
CEO, FISITA



We are representing major global producers in Italy and abroad. Our sales people are market focused and technical experts who offer solutions to customers' problems, utilizing our comprehensive and complementary product portfolio.

We developed raw materials as an alternative to Copper powder (metals and special minerals) and special polymer helping in NVH reduction, increasing its compressibility.

We are involved in environmental sustainability projects for "green" solution in solvent free adhesives.

Our presence in the braking industry is becoming more and more capillary, and we are glad to be partners with the most important Groups involved in the automotive branch. Our aim is to continue to grow up in terms of share and competence.

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EuroBrake is an essential learning and networking event for all engineers, scientists and executives concerned with braking systems throughout the value-chain from OEMs through to materials suppliers including:

Passenger car
Commercial vehicle
Motorcycle
Aerospace
Rail
Industry brakes
Wind turbines

Academia and research
Application
Research and development
Materials
Quality and process
Testing and measurement
Sales and purchasing



EuroBrake 2019 is organised by FISITA, the international federation for mobility engineers.

Established in 1948, FISITA links the national automotive engineering societies in 37 countries representing over 210,000 engineering professionals and organises the biennial FISITA World Automotive Congress, the annual World Mobility Summit and the FISITA PLUS Conference.

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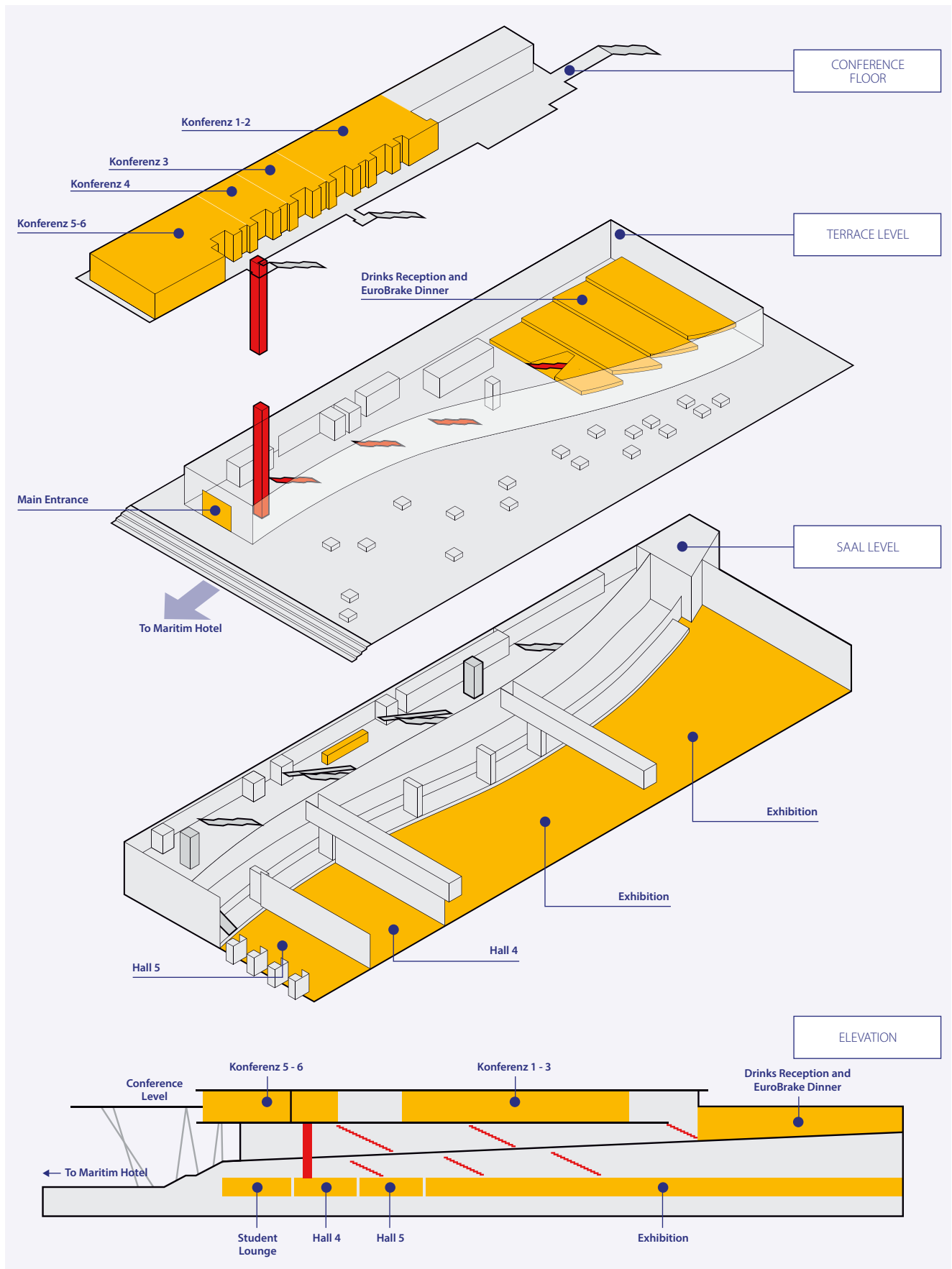
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Prof. Frank Zhao

FISITA Chief Executive
Chris Mason

EuroBrake Manager
Gemma Wilkins
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EuroBrake 2019 Floor Plans



EuroBrake 2019 Overview

Tuesday 21 May 2019			
11:00	Registration Opens		
10:00 - 12:00	Student Introductory Lecture – Student Lounge		
13:00 - 13:15	Welcome and Introduction to EuroBrake 2019		
13:15 - 13:25	Student Opportunities Programme at EuroBrake		
13:25 - 14:25	Opening Plenary Session – Prof. Dr.-Ing. Manfred Krafczyk, TU Braunschweig, Germany Mr. Ignacio Lafuente, Applus IDIADA, Spain		
14:00	Exhibition Opens		
14:25 - 14:40	Break – Exhibition Hall		
14:40 - 16:00	FMM – Fundamentals: Models and Methods	ITB – Innovative Tools for Brake Testing	RTP – Brake Rotors: Design and Performance
16:00 - 16:20	Break – Exhibition Hall		
16:20 - 18:00	DBC – Design of Brake Components	FFL – Fundamentals: Friction Layer	BE1 – Brake Emissions: Sampling, Measurement and Characterisation
18:00 - 19:30	Official EuroBrake 2019 Welcome Reception – Sponsored by NUCAP - Exhibition Hall		
Wednesday 22 May 2019			
08:30 - 10:10	SBDC – Progressive Brake Disc Coatings SIBD – Innovative Brake System Design Approaches	FMV – Fundamentals: Vibrations Panel Discussion – Lifelong Brakes: Opportunities and Challenges	
10:10 - 10:40	Break – Exhibition Hall		
10:40 - 12:20	RWA – Rail Wheel Contact and Adhesion ISO – International Regulations and Standards: ISO Project Review	SITF – Special Session - Innovative Technologies and Functions in Electronic Brake Systems BSS – Brake Squeal: Simulation and Test Methods	
12:20 - 13:50	Lunch – Exhibition Hall		
12:30 - 13:30	Poster Short Talk Session		
13:30 - 14:00	Poster Viewing Session		
14:00 - 15:40	Rail Panel – High Speed Trains Worldwide: Opportunities and Limitations PMD - Pad Material and Design	SVDE – Virtual Development of Electronic Brake Systems WSP – Workshop on Brake Emissions: Part 1	
15:40 - 16:10	Break – Exhibition Hall		
16:10 - 17:50	RBS – Rail Brake System and Components CGN – Creep-Groan Noise	RMA – Raw Materials WSP – Workshop on Brake Emissions: Part 2	
18:00 - 19:00	EuroBrake Drinks Reception – Sponsored by Head Acoustics		
19:00 - 22:30	EuroBrake Dinner – Sponsored by Brembo		
Thursday 23 May 2019			
08:30 - 10:10	RBT – Rail Brake Testing and Simulation	RTE – Brake Rotors: Thermal Effects	BE2 – Brake Emissions: Fundamentals and Innovation
10:10 - 10:40	Break – Exhibition Hall		
10:40 - 12:20	EuroBrake 2019 Strategy Panel		ADT - Advanced Dynamometer and Vehicle Testing
12:20 - 13:50	Lunch – Exhibition Hall		
13:20 - 15:00	FMC – Friction Material Characterisation	LBR – Lightweight Brake Rotors	EMB – Electromechanical Brakes
15:00 - 15:20	Break – Exhibition Hall		
15:20 - 16:40	FMG – Fundamentals: General	NVH – NVH Test and Reduction Methods	FMF – Friction Material Formulation
16:40	Exhibition Closes		
16:40 - 18:00	EuroBrake Farewell Reception		

Organisation

Steering Committee



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Chairman EuroBrake 2019
Consultant



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EuroBrake 2019 Project
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The EuroBrake Advisory Board consists of representatives from major companies and research institutions that lead the field in braking technology today.

The Advisory Board provides strategic advice and helps to ensure that EuroBrake continues to meet the needs of the international braking community.



Ralph Lauxmann
Continental AG



Dr. Rainer Müller-Finkeldei
Daimler AG



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Where will you take us next?

FISITA 
Promoting excellence in mobility engineering

EuroBrake Student Opportunities Programme 2019



EuroBrake 2018 saw the second successful Student Opportunities Programme, where 50 engineering students from around the world were given the unique opportunity to attend EuroBrake as part of a sponsored programme.

At EuroBrake 2019 the Student Opportunities Programme will again offer international students the chance to attend and take part in the world's largest conference and exhibition dedicated to braking technology.

Students will:

- **Meet with top experts from industry and academia**
- **Access the exclusive Student Lounge to network with peers and professionals**
- **Attend a dedicated Introductory Lecture on the basics of braking, including a valuable overview of key EuroBrake sessions**
- **Discuss your career options and get CV advice from management and HR professionals in the brake industry**
- **Participate in specialised round table discussions and surgery sessions**
- **Attend the EuroBrake Dinner**
- **Gain financial assistance with hotel and travel expenses**

The sponsored student delegate passes will include full access to the Technical Programme and entry to the EuroBrake Exhibition, giving participants the chance to connect with organisations at the heart of the industry.

Within the conference students will learn about the latest industry innovations and have the chance to participate in expert discussions on new technology.



University of Hertfordshire student Kim Everitt attended EuroBrake 2018 via ESOP. She said: "This event has multiple amazing opportunities for all - as a result of attending EuroBrake, I am more confident in my abilities and excited to continue pursuing my career in automotive engineering. I encourage other students to apply for ESOP 2019 and I hope to return as a delegate."

Find out about the Student Opportunities Programme 2019:
www.eurobrake.net/students



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Support the Student Opportunities Programme at EuroBrake 2019



Do you want to engage with and advise engineering students who could become the mobility talent of tomorrow?

Will you help to guide and support students who have a passion for engineering to join our international community?

As your company looks to the future and embraces the challenge of technology changes and trends, your support will help to inspire the next generation of mobility engineers and technologists at EuroBrake 2019.

The Student Opportunities Programme was a success at EuroBrake 2018, with 50 international students attending – this is a unique platform for your organisation to meet with and advise those looking to enter the braking industry and support students at this year's event to learn first-hand about their career options as they enter the mobility industry.

By supporting the Student Opportunities Programme Sponsor, you will be invited to meet with participants in the Student Lounge, a designated area for students, industry and academics to network.

Thanks to our current supporters:



A range of benefits include:

- Opportunities to view student CVs prior to EuroBrake and arrange 1-2-1 meetings at the event
- Take part in a 'CV check' session at EuroBrake - arrange for a member of your HR department to attend and offer information, advice and guidance to students entering the industry
- Your company name & logo included in the EuroBrake Final Programme, website and app
- Your company name and logo on the ESOP Wall in the Student Lounge
- Opportunities to meet and network with students in the dedicated Student Lounge

To support the Student Opportunities Programme at EuroBrake 2019 contact Nadine Lloyd at sales@fisita.com or call +44 (0) 1279 883470

"In establishing the EuroBrake Student Opportunities Program (ESOP), FISITA has made an immeasurable contribution to our entire brake industry. Attracting engineering students to our corner of the automotive industry is important. Many students we met with had no idea that there even was an entire industry dedicated to brakes. ESOP provides enormous opportunities for both students and the attending companies." **NUCAP, ESOP Headline Sponsor 2018**



FISITA Foundation

Make your pledge today
Support the next generation of engineers



FISITA has been supporting the world's automotive engineering community for more than 70 years, encouraging and welcoming new talent into our industry. To help strengthen the support for our future generation of engineers, we have established the FISITA Foundation.

How can you get involved?

Donations of any amount to the Foundation will create more opportunities for young engineers to take advantages of the unique FISITA Travel Bursary, in order for them to fulfil work experience opportunities within our industry.

Start making a difference today by making a pledge.

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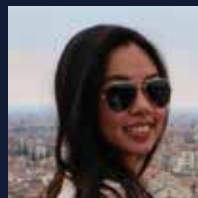
Testimonials



Quirin Anker

Msc Automotive Engineering, Munich University of Applied Science

"Without the FISITA Travel Bursary I wouldn't have been able to cope with the costs. It helped me enormously to focus on studying and working at my placement. I am very thankful and greatly appreciate the support of FISITA to help young engineers going abroad and gathering valuable experiences."



Hannah Waters

BSc Mechanical Engineering and Italian, University of Rhode Island

"I've learned a lot about how an automotive company operates, made great connections, improved my Italian, and had a lot of fun. I can't wait to see what the future holds, and I know it wouldn't be possible without the FISITA Travel Bursary!"

Opening Plenary

Tuesday 21 May 2019

13:00 - 13:15

Welcome and Introduction to EuroBrake 2019



Mr. Harald Abendroth
EuroBrake 2019 Chairman

13:15 - 13:25

Student Opportunities Programme at EuroBrake



Dr.-Ing. Kai Bode
AUDI AG

13:25-14:25

Opening Plenary Session

Chairs:

Mr. Klaus Jäckel, Daimler AG
Prof. Dr. Georg Ostermeyer, TU Braunschweig

Towards High-Resolution Simulation of Spatio-Temporal Fine Dust Dispersion In Urban Areas



Prof. Dr.-Ing. Manfred Krafczyk

Head of Institute, Institute for Computational Modelling in Civil Engineering, Technical University Braunschweig, Germany

Fine / break dust pollution is assumed to be detrimental to public health in urban areas. The main anthropogenic sources of such pollutants are traffic, manufacturing industry and power stations as well as heating systems of private households. In order to investigate the coupled dynamics of individualised traffic and fine dust dispersion due to local airflow on a building scale, we propose a coupled simulation approach.

We propose a coupled modelling and simulation approach resulting in a high-resolution (down to the meter scale) coupled simulation approach coupling a Computational Fluid Dynamics (CFD) research code to a traffic model for individual cars in an urban area. Large scale meteorological conditions enter as boundary conditions for the Large Eddy CFD simulation (LES). As the simulation takes into account the individual buildings in an urban area, reliable local wind profiles can be predicted which are the main driver of fine dust dispersion. A cellular traffic model describing traffic dynamics provides the fine dust distribution which is being advected by the CFD model. The coupled model is implemented on General Purpose Graphics Processing Units (GPGPUs).

We provide preliminary feasibility studies of a comparison between individualized traffic modelling and a homogenized model on a street scale coupled to a mature CFD simulation based on a Cumulant Lattice Boltzmann approach (CLBM). To this end, the presented coupled simulation approach can serve as a starting point for more realistic scenarios.

Braking Systems, Safety Performance: Trends in Future, Legal Requirements and Consumer Protection Programs



Ignacio Lafuente

Head of Commercial Vehicles Homologations department, IDIADA Automotive Technology S.A, Spain

In the fast changing automotive industry, special attention is being paid to technologies such as automated driving and fuel efficiency. However, other systems in the vehicle, such as braking systems, are already experiencing a fast evolution.

Rulemaking fora are working to address these new features and requirements that need to be covered in order to protect the users. At European or International level, these groups allow interested parties -manufacturers, suppliers, governments and NGOs- to share opinions, experiences, knowledge and expectations in order to produce the most cost-effective regulations, in particular these related to active safety and accident avoidance. This presentation deals with some of these issues taking into account the approach used by the authorities.

14:25 - 14:40



Break – Exhibition Hall

Technical Programme

Tuesday 21 May 2019

14:40 - 16:00 Technical Sessions		
FMM - Fundamentals: Models and Methods	ITB - Innovative Tools for Brake Testing	RTP - Brake Rotors: Design and Performance
<p>Chair: Prof. Yannick Desplanques University of Lille</p> <p>Co-Chair: Dr. Axel Stenkamp TMD Friction</p>	<p>Chair: Mr. Claudio Prina IVECO</p> <p>Co-Chair: Mr. Florian Guckeisen Volkswagen</p>	<p>Chair: Dr. David Bryant University of Bradford</p> <p>Co-Chair: Dipl.-Ing. Ralf Meyer Volkswagen</p>
<p>EB2019-SVM-030 </p> <p>A High Fidelity Predictive Model of Hydraulic Brakes for Frontloading, Design Selection, and Prediction of Brake Pedal Feel</p> <p>Mr. Arun Prasath Balakrishnan Mahindra Rise</p> <p>Mr. Vijay V Mahindra & Mahindra India</p>	<p>EB2019-SVM-029 </p> <p>Modelisation of the Vibratory Dynamics of an Aircraft Braking System</p> <p>Ing. Alexy Mercier Safran Landing Systems / LTDS</p> <p>Dr.-Ing. Abdelbasset Hamdi, Ing. Jean-Frédéric Diebold Safran Landing Systems</p> <p>Prof. Dr.-Ing. Louis Jezequel, Dr. Sébastien Besset Laboratoire LTDS/ Ecole Centrale de Lyon, France</p>	<p>EB2019-MDS-023 </p> <p>Development of a Wheel Hub Integrated Brake Disc</p> <p>Mr. Marcelino de la Cruz, Dr.-Ing. Hans-Willi Raedt Hirschvogel Automotive Group,</p> <p>Mr. Wilfried Strauß Fritz Winter Eisengießerei GmbH & Co. KG Germany</p>
<p>EB2019-SVM-041 </p> <p>Overview and Potential Analysis of Virtual Methods in the Development of Modern Brake System</p> <p>Mr. Philippe Stegmann Audi AG</p> <p>Mr. Fabian Fontana IVK University of Stuttgart Germany</p>	<p>EB2019-SVM-033 </p> <p>Runway Tests of Anti-Locking (ABS) System for Mid-Sized Airplane</p> <p>Dr. Eng. Zbigniew Skorupka Instytut Lotnictwa Poland</p>	<p>EB2019-MDS-020 </p> <p>Hard-Metal Coated Brake Discs – Investigations of Tribology, Mechanical Robustness and Wear Products</p> <p>Dr.-Ing. Sebastian Gramstat, Dipl.-Ing. Robert Waninger, Dr.-Ing. Bertram Reinhold, Dr. Heino Sieber AUDI AG Germany</p>
<p>EB2019-IBC-015 </p> <p>Automotive Regenerative Braking Systems</p> <p>Mr. Devtanu Bose Amity University Kolkata</p> <p>Mr. Bineet Bhattacharya India</p>	<p>EB2019-MFM-009 </p> <p>A Simple Method for Detecting Cracks in the Friction Material of Brake Pads Using Vibration Analysis</p> <p>Ms. Sarah Dean, Dr.-Ing. Alex Van den Bossche, Mr. Jan Lemmens GrindoSonic BVBA Belgium</p>	<p>EB2019-MDS-004 </p> <p>The Dynamic E-Module – The Great Unknown in The Practical Procedure to Determine the Natural Frequency Target Value of Brake Discs</p> <p>Mr. Reiner Becker, Mr. Wilfried Strauss Fritz Winter Eisengießerei GmbH & CoKg Germany</p>
<p>EB2019-IBC-004 </p> <p>Development of Inertia Simulation Range Calculation Software for Brake Dynamometer</p> <p>Mr. Zhongquan Shuai CRRC QIshuYan Institute CO.,LTD.</p> <p>Prof. Fei Gao, Prof. Dr. Rong Fu, Dr. Wei Qi Dalian Jiaotong University China</p>	<p>EB2019-MFM-010 </p> <p>Objective Method for Crack Detection in Brake Friction Material</p> <p>Richard Kaatz KBAutoSys</p> <p>Saikiran Divakaruni ZF Group</p> <p>Donald Yuhas IMS, United States</p>	<p>EB2019-MDS-042 </p> <p>Natural Frequency – Chances and Restrictions based on Materials Design</p> <p>Mr. Wolfgang Huschenhöfer Buderus Guss GmbH Germany</p>

Key to Technical Sessions

-  Full written papers will be included in the Proceedings of EuroBrake 2019.
 -  Oral papers are authors' presentations supported by PowerPoint presentations only.
- Main author: First listed name.
Presenting author: bold.

Where permission has been given by the author, full technical papers and presentations of 'oral-only' authors will be available in PDF format in the Conference Proceedings

The EuroBrake app will include abstracts for all papers: full written papers, oral-only presentations and posters.

16:00 - 16:20

Break – Exhibition Hall

Technical Programme

Tuesday 21 May 2019

16:20 - 18:00 Technical Sessions		
DBC - Design of Brake Components	FFL - Fundamentals: Friction Layer	BE1 – Brake Emissions: Sampling, Measurement and Characterisation
<p>Chair: Mr. Tobias Ell EvoBus GmbH</p> <p>Co-Chair: Dr. Andy Smith Alcon Components Ltd.</p>	<p>Chair: Prof. Utz Von Wagner TU Berlin</p> <p>Co-Chair: Prof. Francesco Massi University of Rome "La Sapienza"</p>	<p>Chair: Prof. Dr. Klaus Augsburg TU Ilmenau</p> <p>Co-Chair: Mr. Guido Perricone BREMBO S.p.A.</p>
<p>EEB2019-IBC-013 </p> <p>Evaluation of Concept Vehicles Using a Multiple Affective Rating Scale</p> <p>Mr. Masanori Matsuoka ADVICS Co Ltd / Research & Development Dept. Sect. 3</p> <p>Dr. Yukio Nishizawa Advics Co Ltd Japan</p>	<p>EB2019-SVM-040 </p> <p>A Multi-Scale Model of Braking System Including Tribolayer Mechanisms for Wear Simulation</p> <p>Prof. Philippe Dufrenoy University of Lille</p> <p>Mr. Vincent Magnier University of Lille (Laboratory LaMcube) France</p>	<p>EB2019-EBS-007 </p> <p>Particle Size Distribution Measurements as a New Approach for Characterization of Brake Lining Materials</p> <p>Dr. Dmytro Lugovyy, Mr. Matthias Schroeder, Horiba Europa GmbH</p> <p>Dr. Sebastian Gramstat AUDI, Germany</p>
<p>EB2019-IBC-022 </p> <p>Brakes 2025 – Design of an Electromechanical Drum Brake</p> <p>Mr. Christian Vey, Dr.-Ing. Jens Hoffmann, Dr.-Ing. Martin Semsch, Mr. Sébastien Pla, Continental Teves AG & Co. oHG Germany</p>	<p>EB2019-FBR-006 </p> <p>The Actual Measurement of Dynamic Pressure Distributions of Inner and Outer Pads Using Inverse Analysis</p> <p>Dr. Eng. Masanori Inoue Akebono Brake Industry Co., Ltd.</p> <p>Prof. Dr.-Ing. Kenji Amaya, Dr. Eng. Yuki Onishi, Mr. Yuki Nakagawa, Tokyo Institute of Technology Japan</p>	<p>EB2019-FBR-011 </p> <p>A Study of Brake Contact Pairs Under Different Brake Conditions with Respect to Airborne Wear Particle Emissions</p> <p>Mr. Long Wei, Dr. Yatsze Choy, Prof. Chunshun Cheung, The Hong Kong Polytechnic University China - Hong Kong</p>
<p>EB2019-SVM-039 </p> <p>Efficient Design Process of Brake Systems Based on Testing, Simulation and Optimization</p> <p>Dr.-Ing. Igor Iroz, Dipl.-Ing. Sergio Carvajal, Dr.-Ing. Matthias Leber, Dr. Ing. h.c. F. Porsche AG, Dr.-Ing. Nils Wagner INTES GmbH Germany</p>	<p>EB2019-FBR-022 </p> <p>Surface Reservoir Dynamics in Friction Interfaces</p> <p>Prof. Dr.-Ing. Georg-Peter Ostermeyer, Mr. Jacek Kijanski TU Braunschweig Germany</p>	<p>EB2019-EBS-027 </p> <p>Thermal and Braking Regimes During Proving Ground Measurements Using the WLTP-Brake Cycle for Brake Emissions Measurements</p> <p>Mr. Carlos Agudelo, Mr. Ravi Teja Vedula, Mr. Josh Bautell Link Engineering Co.</p> <p>Mr. Alan Stanard, Mr. Tim DeFries ERG, United States</p>
<p>EB2019-MDS-030 </p> <p>Design Optimisation of Formula 1 Brake Caliper</p> <p>Dr. Marko Tirovic, Dr. Nicolas Sergent, Mr. Clive Temple Cranfield University United Kingdom</p>	<p>EB2019-FBR-029 </p> <p>Contact Localization and Surface Evolution Related to Squeal Occurrence</p> <p>Prof. Philippe Dufrenoy University of Lille France</p>	<p>EB2019-FBR-016 </p> <p>Chemical and Physical Characterization Brake Wear Particle Under Novel Brake Wear Particle Emission Cycle</p> <p>Dr. Hiroyuki Hagino Japan Automobile Research Institute Japan</p>
<p>EB2019-EBS-019 </p> <p>Development and Advantages of a New Lightweight Floating Caliper Design</p> <p>Mr. Falko Wagner, Prof. Dr.-Ing. Ralph Mayer, Dipl.-Ing. Lutz Pander Technische Universität Chemnitz</p> <p>Mr. Gernot Sprandel, Mr. Claus-Peter Weidner Daimler AG, Germany</p>	<p>EB2019-SVM-036 </p> <p>Modelling of Real Contact Surfaces: Application to Brake Squeal</p> <p>Mr. Yassine El Attaoui, Mr. Jérémy Sadet, Dr. Franck Massa, Prof. Thierry Tison, Dr. Laurent Coustenoble, Prof. Maxence Bigerelle Hauts-de-France Polytechnic University / LAMIH UMR CNRS 8201 France</p> <p>Ing. JeongKyu Kim Hyundai Motors Group Republic of Korea</p>	<p>EB2019-SVM-037 </p> <p>High-Fidelity Modelling and Characterization of Dynamometer Enclosure Interactions Using a DOE Approach for Brake Emissions Measurements</p> <p>Mr. Carlos Agudelo, Mr. Josh Bautell Link Engineering Co.</p> <p>Mr. Jesse Capacelatro, Ms. Qingquan (Megan) Wang University of Michigan, United States</p>

18:00 - 19:30 Official EuroBrake Welcome Reception – Exhibition Hall

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Technical Programme

Wednesday 22 May 2019

Panel Discussion

Lifelong Brakes: Opportunities and Challenges

08:30 – 10:10



Chair:

Univ.-Prof. Dr.-Ing. Ralph Mayer

Professor of Vehicle Systems Design,
Chemnitz University of Technology



Chair:

Dr.-Ing. Michael Kleczka

Senior Manager Advanced Chassis Engineering,
Daimler AG

As a consequence of advanced friction couples and alternative powertrains, and the possibility for recuperation, lifelong brakes now seem to be feasible.

The aftermarket for friction material and brake rotors is an important industry with significant commercial impact for all levels of the supply chain. Companies and groups involved in the aftermarket business, who are also financing research and development, are highly concerned.

How far is this trend also justified in technical terms?

How long will it take until we see relevant market shares of alternative powertrains with remaining large suppliers of conventional systems? Broad uptake of coated brake rotors is debatable. Major hurdles are corrosion and rust, which can appear in different ways. Long-term behavior of shims or backing plates / bonding is relatively unknown.

We may expect new brake concepts, which can be optimised for dust emissions, corrosion and reliability. But we also must look for conclusive answers regarding:

- Technical challenges
- New requirements for testing
- Commercial consequences
- Technical inspection
- Legal impact
- Sustainability
- Total cost of ownership

The Panel Discussion will highlight various aspects of life-long brakes together with professionals from different sectors.

Panellists:

Mr. Michael Schog,

Director, Foundation Brake Engineering, ZF Group Active Safety Systems

Dr.-Ing. Jens Hoffmann

Manager, Advanced Development, Continental Chassis & Safety

Dr. Agusti Sin

Materials & Process Innovation Director, ITT Friction Technologies

Mr. Yukihiro Shiomi

Project General Manager, Chassis Development Div., Toyota Motor Corporation

Dr. Gregory M. Vyletel















Executive Director, Engineering – AM Braking, Tenneco

Dr.-Ing. Jaroslaw Grochowicz

Technical Specialist, Ford Werke GmbH

Technical Programme

Wednesday 22 May 2019

08:30 - 10:10 Technical Sessions		
FMV - Fundamentals: Vibrations	SBDC - Progressive Brake Disc Coatings	SIBD - Innovative Brake System Design Approaches
<p>Chair: Prof. Georg Ostermeyer Technical University Braunschweig</p> <p>Co-Chair: Mr. Parimal Mody NUCAP Global</p>	<p>Chair: Dr. Sebastian Gramstat AUDI AG</p> <p>Co-Chair: Prof. David Barton Leeds University</p>	<p>Chair: Mr. Michael Lingg Volkswagen</p> <p>Co-Chair: Mr. Paul Linhoff Continental AG</p>
<p>EB2019-FBR-014 </p> <p>High-Frequency Vibrations in the Friction Boundary Layer of Brake Systems</p> <p>Mr. Johannes Otto, Mr. Jan Malte Sandgaard, Prof. Dr.-Ing. Georg-Peter Ostermeyer TU Braunschweig, Germany</p>	<p>EB2019-MDS-003 </p> <p>Investigations on an Oxide Coated Aluminium Brake Rotor</p> <p>Mr. Florian Gulden, Dr.-Ing. Heinz Werner Hoepfel FAU Erlangen-Nürnberg</p> <p>Dr.-Ing. Sebastian Gramstat, Dr.-Ing. Anton Stich AUDI AG</p> <p>Prof. Dr.-Ing. Ulrich Tetzlaff TH Ingolstadt Germany</p>	<p>EB2019-IBC-016 </p> <p>Current and Future Topics in the Development of Brake Systems</p> <p>Dipl.-Ing. Aaron Völpel, Dipl.-Ing. Frank Stebner, Dipl.-Ing. Michael Lingg Volkswagen AG Germany</p>
<p>EB2019-EBS-020 </p> <p>Early Stages of Friction-Induced Vibration: First Results on Links with Friction Mechanisms at the Interface</p> <p>Dr. Anne-Lise Cristol, Ing. Edouard Davin, Dr. Jean-François Brunel, Prof. Yannick Desplanques LaMcube - Centrale Lille</p> <p>Dr. David Troadec IEMN, France</p>	<p>EB2019-EBS-005 </p> <p>Coated Rotors for the Use in Electrical Vehicles with Regard of CO² And Fine Dust Emission Reduction</p> <p>Mr. Reiner Becker, Mr. Wilfried Strauss Fritz Winter Eisengießerei GmbH & CoKg Germany</p>	<p>EB2019-IBC-011 </p> <p>Impact of Increased Non-Frictional Braking to the Future Design of Disc Brakes in Commercial Vehicles</p> <p>Dipl.-Ing. Paul Henning WABCO Germany</p>
<p>EB2019-SVM-027 </p> <p>The Influence of Differential Pad Wear on Low-Frequency and High-Frequency Brake Squeal</p> <p>Mr. Johannes Otto, Prof. Dr.-Ing. Georg-Peter Ostermeyer TU Braunschweig, Germany</p> <p>Dr. Seong Rhee SKR Consulting LLC, United States</p>	<p>EB2019-EBS-024 </p> <p>Hard-Coated Brake Discs – First Field Review and Requirements Concerning Bev Applications</p> <p>Mr. Manuel Wirth, Mr. Manuel Rodrigues, Mr. Karl Haun, Dr. Matthias Leber, Mr. Donatus Neudeck Porsche AG Germany</p>	<p>EB2019-EBS-031 </p> <p>Developing Brake Systems – Ideas for Tomorrow</p> <p>Dr. Martin Treimer, Ulrich Kuhn, Philipp Buck BMW Group GERMANY</p>
<p>EB2019-SVM-035 </p> <p>Brake Noise Detection Using Deep Learning</p> <p>Dipl.-Ing. Merten Stender, Prof. Dr. Norbert Hoffmann Hamburg University of Technology</p> <p>Dr.-Ing. Merten Tiedemann AUDI AG Ingolstadt, Germany</p>	<p>EB2019-EBS-028 </p> <p>The RELIABLE project: Wear Resistant Lightweight Aluminium Brakes for Vehicles</p> <p>Mr. Robin Francis Keronite International Limited United Kingdom</p>	<p>EB2019-IBC-029 </p> <p>Future Chassis Systems Approach</p> <p>Mr. Paul Linhoff, Mr. Sebastian Müller Continental Teves AG & Co. oHG, Germany</p>
<p>EB2019-FBR-007 </p> <p>Stick-Slip Phenomenon of a Lubricated Contact in Spring Brake Systems</p> <p>Ing. Ilaria Ghezzi LaMCoS, INSA - Lyon/ DIMA, University La Sapienza of Rome / Somfy</p> <p>Ing. Michael Rovere, Ing. Cedric Le Coeur SOMFY S.A.</p> <p>Prof. Dr.-Ing. Yves Berthier LaMCoS, Institut National des Sciences Appliquées de Lyon (INSA), France</p> <p>Dr.-Ing. Davide Tonazzi Prof. Dr.-Ing. Francesco Massi DIMA, University La Sapienza of Rome Italy</p>	<p>EB2019-MDS-038 </p> <p>Coating of Brake Discs through Extreme High-speed Laser Material Deposition</p> <p>Dipl.-Ing. Thomas Schopphoven, Dr.-Ing. Andres Gasser Fraunhofer Institute for Laser Technology ILT</p> <p>Dr.-Ing. Tobias Phillip Utsch HPL Technologies GmbH</p> <p>Prof. Dr.-Ing. Johannes Henrich Schleifenbaum Fraunhofer Institute for Laser Technology ILT, RWTH Aachen University - Digital Additive Production DAP Germany</p>	

10:10 - 10:40 Break – Exhibition Hall

Technical Programme

Wednesday 22 May 2019

International Regulations and Standards: ISO Project Review

10:40 – 12:20



Chair:
Mr. Harald Abendroth
Consultant



Chair:
Dr. Jaroslaw Grochowicz
Ford Werke GmbH

EB2019-MDS-040

ISO - Corrosion

Dr. Agusti Sin

ITT Friction Technologies
Italy



EB2019-MFM-013

**ISO PWI 22593 Standardization of
Dragmode Friction Test for Hydraulic And
Pneumatic Vehicle Brakes**

Peter Krauss

Link Engineering Co.
United States



EB2019-MFM-006

**Regulatory Framework State of the Art
Regarding Braking Systems for Highly
Automated Vehicles in Europe and USA**

Mr. Ignacio Lafuente, Mr. Jaume Llop,
Mrs. Marta Tobar, Mrs. Estrella Martínez,
Eng Carlos Luján

IDIADA Automotive Technolgy
Spain



EB2019-MDS-026

**ISO PWI 22596 Metal Pick Up (MPU)
and Disc Grooves in Vehicle Brakes:
Development of ISO Test Standard**

Dr.-Ing. Jaroslaw Grochowicz

Ford Werke GmbH
Germany



EB2019-FBR-030

**ISO 6310 Revision - Brake linings —
Compressive Strain Test Methods**

Dr. Andreas Giese

Federal-Mogul Bremsbelag
Germany



EB2019-MFM-001

**Standard Load Spectra for Commercial
Vehicle Brakes**

Dipl.-Ing. Kevin Lucan,
Prof. Dr.-Ing. Bernd Bertsche
IMA - University of Stuttgart
Germany



EB2019-FBR-005

**JSAE Global Standardization Activities
Update**

Mr. Toshiro Miyazaki

Akebono Brake Industry Co., Ltd.

Mr. Shigeru Sakamoto

Toyota Motor Corporation
Japan



EB2019-MFM-011

Friction relevant Brake Disc Specification

Dr.-Ing. Sebastian Gramstat

AUDI AG
Germany



Mr. Carlos Agudelo

Link Engineering Co.
United States

EB2019-MDS-009

**Analysis of Metal Pickup Growth
Mechanism within Automotive
Brake Pads**

Dr. Hirokazu Noda

Ask Technica Corporation

Prof. Dr. Takahiro Takei

University of Yamanashi
Japan



EB2019-MFM-012

**SAE Standards Update and Joint Projects
with ISO**
















Mr. Carlos Agudelo

Link Engineering Co.
United States



Technical Programme

Wednesday 22 May 2019

10:40 - 12:20 Technical Sessions		
BSS - Brake Squeal: Simulation and Test Methods	RWA - Rail Wheel Contact and Adhesion	SITF - Innovative Technologies and Functions in Electronic Brake Systems
<p>Chair: Mr. Thierry Chancelier Chassis Brakes International</p> <p>Co-Chair: Dr. Torsten Treyde ZF TRW</p>	<p>Chair: Mr. Johannes Gräber Knorr-Bremse</p> <p>Co-Chair: Dr. Peter Brooks University of Leeds</p>	<p>Chair: Dr.-Ing. Edwin Liebemann Robert Bosch GmbH</p> <p>Co-Chair: Dr. Hans-Jörg Feigel Mando Halla</p>
<p>EB2019-SVM-002 </p> <p>Statistical Analysis of Squeal Reduction Effect by Shape Optimization Methods Mr. Dong Joon Min, Mr. Sang Chan Park, Mr. Kyung Hwan Park Hyundai Mobis Republic of Korea</p>	<p>EB2019-FBR-025 </p> <p>Analysis of the Influence of the Material Output Rate on the Coefficient of Friction Mr. Michael Kölher IFS - RWTH Aachen</p> <p>Mr. Alexander Reich Nowe GmbH A Wabtec Company, Germany</p>	<p>EB2019-IBC-026 </p> <p>On the Way to The Self Driving Cabin: How System and Technology Transformation Will Challenge the Braking Systems Industry Mr. Josko Kurbasa Mando Corporation Europe GmbH Germany</p>
<p>EB2019-SVM-025 </p> <p>MDRE: An Efficient Expansion Tool to Perform Model Updating from Squeal Measurements Dr. Eng. Guillaume Martin, Prof. Dr. Etienne Balmes, Dr. Eng. Guillaume Vermot des Roches SDTools</p> <p>Ing. Thierry Chancelier Chassis Brakes International France</p>	<p>EB2019-FBR-008 </p> <p>Effect of Perforated Structure of Friction Block on the Brake Characteristics of Railway Brake Systems Under Dry and Sandy Conditions Prof. Dr. Jiliang Mo, Mr. Bin Tang, Mr. Zhiyong Fan, Prof. Dr. Minhao Zhu, Prof. Dr. Zhongrong Zhou Southwest Jiaotong University</p> <p>Mr. Jingwu Cao, Mrs. Peifang Wu Beijing Tianyishangjia New Material Corp., Ltd. China</p>	<p>EB2019-IBC-024 </p> <p>Braking Systems Functional Safety Dipl.-Ing. Michael Schneider, Dr. Jörg Müller ZF Active Safety Systems GmbH Germany</p>
<p>EB2019-SVM-022 </p> <p>Influence of Nonlinear Effects on the Eigenvector of a Mode Coupling System Mr. Benedikt Koll Volkswagen AG</p> <p>Mr. Johannes Otto, Prof. Dr.-Ing. Georg-Peter Ostermeyer TU Braunschweig Germany</p>	<p>EB2019-IBC-010 </p> <p>Adaptive Wheel Slide Protection Algorithms Dr. Matteo Frea, Ing. Salvatore Perna, Ing. Roberto Tione Faiveley Transport, Italy</p>	<p>EB2019-IBC-007 </p> <p>Dynamic Braking with an Electric Parking Brake System Dr.-Ing. Christof Maron, Mr. Karsten Klein Continental Teves AG & Co. oHG Germany</p>
<p>EB2019-SVM-009 </p> <p>A Homogenization Approach for Brake Pad Shims: Finite Element Modelling and Complex Eigenvalue Analysis Mr. Dominik Schmid, Dr.-Ing. Nils Gräbner, Prof. Dr.-Ing. Utz von Wagner TU Berlin Germany</p>	<p>EB2019-IBC-021 </p> <p>Impact of Slip at Low Adhesion Conditions Caused by Various Contaminants Dr.-Ing. Marcus Fischer Knorr-Bremse Systeme für Schienenfahrzeuge GmbH</p> <p>Mr. Steffen Jennek Siemens Mobility GmbH, Germany</p> <p>Dr. Ferenc Szekely Knorr-Bremse Hungária Kft., Hungary</p> <p>Mr. Matteo Frea Faiveley Transport a Wabtec Company, Italy</p>	<p>EB2019-EBS-025 </p> <p>Potential of Regenerative Brake Systems Regarding Reduction of Brake Particle Emission Mr. Toni Frenzel, Dr. Anselm Stüken Robert Bosch GmbH, Chassis System Control - System Development Brake Systems</p> <p>Prof. Dr.-Ing. Klaus Augsburg TU Ilmenau Germany</p>
<p>EB2019-SVM-024 </p> <p>A First-Principles Semi-Empirical Method for Brake Squeal Assessment Mr. Narcís Molina, Dr. Juan Jesús García, Mr. Ángel Sánchez, Ing. Fabio Squadrani, Mr. Raul Ureña Applus IDIADA Spain</p>	<p>EB2019-SVM-012 </p> <p>Wheel-Rail Adhesion Limit in Presence of Load Dynamics and Inter-Axles Cleaning Effect Dr. Matteo Frea, Ing. Salvatore Perna Faiveley Transport, Italy</p>	<p>EB2019-IBC-028 </p> <p>Requirements on Electronic Brake Systems for Automated Driving – an OEM perspective Dr. Sebastian Strasser, Herbert Ernst, Stefan Jilg AUDI AG Germany</p>
<p>12:20 - 14:00 Lunch – Exhibition Hall</p>		

Poster Short Talk Session and Poster Viewing Session



Session Chairs:

Prof. David Barton University of Leeds
Dr. Agusti Sin ITT Friction Technologies

Poster Short Talk Session **12:30 – 13:30**

Poster Viewing Session **13:30 – 14:00**

EuroBrake 2019 posters will be on display throughout the conference and the final abstract from each poster will be available to download on the EuroBrake 2019 website and App. Full technical papers submitted alongside the posters, are available on the EuroBrake Proceedings USB and will also be made available online to registered delegates after the conference.

The technical and research content of selected submissions will be briefly highlighted in the Poster Short Talk Session, which will take place accompanied by lunch. All delegates are invited to this important session. Authors will then be available to further discuss their poster presentations in the Poster Viewing Session which will immediately follow. Authors will also be available to discuss their posters during the Welcome Drinks Reception on the evening of Tuesday 21 May, or during coffee breaks throughout the conference.

Best Poster Prizes

The top three posters will be awarded a prize at the EuroBrake Dinner on the evening of Wednesday 22 May.

Posters will be judged by a panel of experts from the EuroBrake Steering Committee, FISITA and others invited from both industry and academia.

1st Place - EUR 700

2nd Place - EUR 500

3rd Place - EUR 300

Sponsored by ITT Friction Technologies



EB2019-EBS-010

Experimental Study on Steering Brake Squeal Based on Bench Test

Mrs. Surong Wu, Mr. Kang Fei, Mr. Le Xi
Continental Brake Systems (Shanghai) Co., Ltd

Mr. Xuegui Yu

Shanghai Automotive Brake Systems Co, Ltd

Mr. Dejian Meng

School of automotive engineering, Tongji University, China

EB2019-MDS-028

From Resin to Brake Pad, a Study of (Visco) Elastic Properties

Dr. Eng. Florence Vivier

ITT Italia srl, Italy

EB2019-SVM-001

Investigations on Creep Groan Concerning Damping Modelling of Macpherson Axle Elastomer Bushings

Dipl.-Ing. Manuel Pürscher,

Dipl.-Ing. Severin Huemer-Kals,

Prof. Dr.-Ing. Peter Fischer

Graz University of Technology, Austria

EB2019-SVM-007

Brake Application Contribution on Vehicle Roll Stability During Downhill/Cornering & Prediction of Brake Component Life

Mr. Prasad Arun Kumar,

Mr. Shinde BabaSaheb, Mr. VA Gopalakrishn,

Mr. Anthonysamy Baskar

Mahindra & Mahindra, India

EB2019-FBR-012

Percentage Braking System

Mr. Seyyedhassan Seyyedfatemi

Omega net

Iran (Islamic Republic Of)

EB2019-MDS-039

Investigation of Stiction Phenomena and Related Inhibitors in Brake Systems by Electrochemical Methods

Dr. Agusti Sin

ITT Friction Technologies, Italy



EB2019-MDS-022

Comparison of Measurement Methods for Fiber Particle Content in Titanate

Mr. Daisuke Taki, Dr. Eng. Hideki Sakai,
Dr. Eng. Hideki Fujii
 Toho Titanium Co., Ltd., Japan

EB2019-MDS-011

Processing Technologies and their Impact on Properties of Minerals and Functional Minerals

Dipl.-Ing. Veronika Mayer
 Kaerntner Montandindustrie GmbH, Austria

EB2019-SVM-006

Efficient Large Multi-Parametric Squeal Simulation and Analysis Using Advanced Model Reduction Tools

Dr.-Ing. Guillaume Vermot des Roches,
 Prof. Dr.-Ing. Etienne Balmes
 SDTools, France
Dr.-Ing. Oliver Stump
 Daimler AG, Germany

EB2019-FBR-004

Brake Pedal Vibration Sensitivity Analysis on a Multi Utility Vehicle

Mr. Prasad Arun Kumar,
 Mr. Shinde Babasaheb, Mr. M Nagaraja
 Mahindra & Mahindra
 India

EB2019-MDS-037

Comparing the Effectiveness of Galvanizing and Nitriding Methods as Protection from Corrosion

Mr. Parimal Mody, Mr. Scott Lambert
 NUCAP Industries, Inc.
 Canada

EB2019-MDS-024

Phase and Morphological Transformations of Friction Layer of a Model Low-Metallic Brake Pads Exposed to Different Conditions During ISO26867

Dr. Katerina Dedkova, Dr. Miroslav Vaculik,
 Dr. Kristina Cabanova,
 Dr. Katerina Mamlulova Kutlakova,
 Dr. Jana Kukutschova
 VSB-Technical University of Ostrava
 Czech Republic

Prof. Peter Filip
 Southern Illinois University
 United States

EB2019-MDS-005

Design and Assessment of a Test Rig for Airborne Brake Wear Debris Measurements

Mr. Asmawi Sanuddin, Prof. Dr. David Barton,
 Assos. Prof. Peter Brooks, Dr. Carl Gilkeson,
 Dr. Shahriar Kosarieh
 University of Leeds
 United Kingdom

EB2019-MFM-002

3D Printing of Friction Material (Part 2) - Waterbased Liquid Friction Compounds

Dr. Roman Milczarek, Dr. Ute Wittig
 LF GmbH & Co. KG
 Germany

EB2019-SVM-026

A New Approach for Testing of Brake Tubes: Consideration of Assembling Based Mistakes

Mr. Onur Tokul, Mr. Ozan Koyuncu
 Bantboru Sanayi ve Ticaret A.Ş.
 Turkey

EB2019-EBS-015

Improving Effectiveness of Regenerative Braking in Electric Vehicles and Hybrid Vehicles

Mr. Aman Singh, Mr. Aadhar Bisht,
 Mr. Mohit Saini
 University of Petroleum and Energy Studies
 India

EB2019-EBS-004

Single Pedal Mechanism for Leg Amputated Person and for the Reduction of Reaction Time

Mr. HariPrasath Thangavelu,
 Mr. Mohnish Arya, Dr. John Alexis
 Kumaraguru College of Technology
 India

EB2019-SVM-003

Automated Braking Tests Using Individually Adjustable Driving Robots

Dipl.-Ing. Tobias Rinnert,
 Prof. Dr.-Ing. Günther Prokop
 Auto Mobil Forschung Dresden GmbH
 Germany

EB2019-FBR-002

Effect of Brake Disc Corrosion on Vehicle Judder Performance

Ing. Fabio Squadrani, Mr. Bernat Ferrer,
 Ms. Laura Ortiz, Mr. Narcis Molina,
 Dr. Juan J. Garcia
 Applus IDIADA
 Spain

EB2019-MDS-013

Best of Both Worlds: Optimized Fibre Reinforcement for Friction Materials

Dr. Jürgen Rothe
 Schwarzwälder Textil-Werke Heinrich
 Kautzmann GmbH
 Germany

EB2019-IBC-027

Development of Electric Drum-in-Hat Parking Brake for Heavy Duty Pick-up Truck

Mr. Chihoon Jo, Mr. Inuk Park, Mr. Inuk Park,
 Mr. Byungsoo Kim, Mr. Byungsoo Kim,
 Mr. Jaehyun Kwon, Mr. Jaehyun Kwon,
 Mr. Minkyu Jung, Mr. Minkyu Jung,
 Mr. Moojin Choi, Mr. Moojin Choi,
 Mr. Daewoong Jun, Mr. Daewoong Jun,
 Mr. Sangchul Jung, Mr. Sangchul Jung
 Hyundai Mobis
 Republic of Korea

Technical Programme

Wednesday 22 May 2019

Rail Panel

High Speed Trains Worldwide: Opportunities and Limitations

14:00 – 15:40



Chair:
Dr. Stefan Dörsch
DB Systemtechnik GmbH



Chair:
Mr. Roberto Tione
WABTEC-Faiveley

This panel brings together leading rail transport experts from both Europe and Asia to discuss future research directions and challenges facing the rail sector. Each panellist will make a short presentation on the status of high-speed rail traffic in their domain. Special focus will be given to braking and safety concepts of high-speed rail vehicles.

Travelling time is one of the most important influences on the decision regarding which means of transport a customer will use. If the train travelling time between major cities exceeds 3-4 hours, a means of transport other than the railway may be chosen.

To allow travel within these time frames, high-speed rail travel will need to become more commonplace and speeds of 250 km/h to 380 km/h can be expected, depending on the country. Not only the trains themselves, but the whole railway system including the signalling and track system must be compatible with these velocities. On the other hand, costs of maintenance and energy consumption are strongly and exponentially dependent on the train velocity. Finding the cost optimal working point in this target space is strongly dependent on the particular situation in each country.

This panel discussion involving leading rail experts will include consideration of the following:

- Which solutions have each country chosen to match their situation?
- What future challenges are there in the high-speed sector (to both industry and operators) and how are these challenges being addressed?
- Did we settle for 380 km/h maximum for regular commercial operations, even in countries where topography and/or travel distances would allow or require higher speeds, due to technical and commercial influences?

Panellists:

Mr. François Cabillon	Consultant
Prof. Dr.-Ing. Christian Schindler	RWTH Aachen University



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Technical Programme

Wednesday 22 May 2019

Panel Workshop

Workshop on Brake Emissions

14:00 - 17:50



Chair:
Dr. Theo Grigoratos
European Commission,
Joint Research Centre, Italy



Chair:
Dr.-Ing Sebastian Gramstat
AUDI AG, Germany

Brake emissions are a multidisciplinary field and therefore experts from different specialised fields are required to tackle the problem. The current workshop deals with the topic, considering five different dimensions:

Non-exhaust contribution to the environment

Many studies with contrasting results have been published and yet fundamental questions remain open. What is the contribution of non-exhaust traffic related sources to the ambient PM concentrations? Are existing PM and PN EFs realistic?

Dr. Hugo Denier van der Gon,
Netherlands Organisation for Applied Scientific Research, TNO

Health relevance of non-exhaust particles

One cannot fully assess the importance of non-exhaust emissions without providing information on health effects. The topic has been treated as taboo for many years. What do we know about possible adverse health effects of non-exhaust particles?

Dr. Miriam Gerlofs,
National Institute for Public Health and the Environment (RIVM)
Netherlands

Measurement approach

On-going activities worldwide employ different methodologies. Harmonization comes with many difficulties and newly risen problems/issues. What are the challenges for applying real-world measurements and how can real world measurements be used for lab tests?

Dr. David Hesse,
TU Ilmenau – EB2019-FBR-017

Dr. Jaroslaw Grochowicz,
Ford Werke GmbH & Carlos Agudelo,
Link Engineering Co.

Tomasz A. Gonet,
Lancaster University – EB2019-EBS-029

Mr. Felix Wenzel,
TU Ilmenau – EB2019-FBR-019

Future perspective – technologies changing the picture

One should take a look to the future and the upcoming technological changes which appear to be rapid. Regenerative braking, AEB, other features but also improvement of the existing materials (i.e. coated discs and life-long pads) are discussed in this session.

Dr. - Ing. Sebastian Gramstat,
AUDI AG on behalf of the German Association of the Automotive Industry, VDA
Additional Speaker to be confirmed

On-going activities worldwide – are we moving towards regulation

Information regarding on-going activities worldwide is provided during this session. Do these activities lead to non-exhaust emissions regulation? What gaps need to be filled in order to move towards regulation?

Dr. Mattia Alemani,
Brembo – EB2019-EBS-023

Dr. Theodoros Grigoratos,
European Commission Joint Research Centre

Speaker from the California Air Resources Board

Technical Programme

Wednesday 22 May 2019

14:00 - 15:40	Technical Sessions	14:00 - 17:50	Technical Sessions
PMD - Pad Material and Design	SVDE - Virtual Development of Electronic Brake Systems	WSP - Workshop on Brake Emissions:	
Chair: Mr. Eros Sales ITT Motion Technologies	Chair: Prof. Manfred Meyer ZF Group	Co-Chair: Dr. Theo Grigoratos European Commission, Joint Research Centre, Italy	
Co-Chair: Mr. Bernd Rohrberg TMD Friction	Co-Chair: Mr. Sebastian Kruse Audi AG	Chair: Dr.-Ing Sebastian Gramstat AUDI AG, Germany	
EB2019-EBS-008	EB2019-IBC-020	B2019-FBR-017	
Disc Brake Pads Regeneration: Preliminary Investigation of The Re-Use of Worn Friction Materials	Model Based Development -Proposals and Requirements for an Integrated Virtual Engineering Process	Real Driving Emissions Measurement of Brake Dust Particles	
Ms. Mara Leonardi , Dr.-Ing. Andrea Dorigato, Dr. Cinzia Menapace, Prof. Stefano Gialanella, Prof. Giovanni Straffelini University of Trento	Dr. Thomas Puetz , Dr.-Ing. Stefan Weiland ZF Active Safety GmbH Germany	Dipl.-Ing. David Hesse, Prof. Dr. Klaus Augsburg, Dipl.-Ing. Toni Feisel TU Ilmenau Germany	
Mr. Luca Menapace Brembo Italy	EB2019-IBC-025	EB2019-FBR-019	
EB2019-MDS-036	BOSCH Connected Development - Chassis Systems - Brakes	Measurement of Tire Wear Particles	
FUSION - An Innovative and Disruptive Manner of Attaching Friction Materials to Back-plates (for Brake Pads)	Mr. Andreas Hoffmann Robert Bosch GmbH, Chassis Systems, CC-AS/ EYB, Germany	Prof. Dr.-Ing. Klaus Augsburg, Mr. Felix Wenzel , TU Ilmenau	
Mr. Parimal Mody , Mr. Troy Hylton, Mr. Ian Currins, Mr. Masoud Arefi NUCAP Industries, Inc., Canada	EB2019-SVM-032	Dr.-Ing. Sebastian Gramstat AUDI AG Germany	
EB2019-MDS-035	Designing Fault-Tolerant Brake Control Algorithms Using Simulation	EB2019-EBS-023	
Light-weight Composite Back-Plates for Disc Brake Pads – Part II	Mr. Steve Miller , Mr. Gaurav Tomar MathWorks Germany	The Lowbrasys Project: A Journey towards a Low Environmental Impact Brake System	
Mr. Parimal Mody , Mr. Sean Foots NUCAP Industries, Inc. Canada	EB2019-IBC-014	Dr.-Ing. Mattia Alemani, Ing. Guido Perricone, Mr. Giorgio Valota, Dr. Gianmarco Giordano Brembo S.p.A.	
EB2019-EBS-017	Safe Brake Control Development of an Aircraft Brake System with a Model Based Software Development Approach	Mr. Walter Cerri Flame Spray, Italy	
Eco Design of Brake Pads with Recycled Friction Materials	Mr. Günther Siegel ANSYS France	Mr. Sebastian Mueller Continental	
Mr. Jijie Ma Zhejiang Normal University, China	Mr. Christian Schrader ANSYS Germany GmbH Germany	Mr. Marcus Morbach Federal Mogul Motorparts Dr. Jaroslaw Grochowicz, Mr. Rainer Vogt, Dr. Marcel Mathissen Ford Germany	
Prof. Anna Hedlund Åström, Dr. Yezhe Lyu, Dr. Jens Wahlström, Prof. Ulf Olofsson, KTH Royal Institute of Technology, Sweden	EB2019-SVM-038	EB2019-EBS-029	
Dr. Mara Leonardi University of Trento Italy	Scenario-based testing for EBS in context of Autonomous Driving	Magnetic Properties of Brake Wear Emissions - Preliminary Results	
EB2019-EBS-018	Dr. Andre Hildebrandt , Mr. Michael Peperhowe, Dr.-Ing. Peter Reinold dSPACE GmbH Germany	Mr. Tomasz A. Gonet, Prof. Barbara A. Maher Lancaster University United Kingdom	
Impact of Geometry, Type of Material and Quality of Punching of The Metallic Support of Brake Pad on Essential Properties of Hydraulic Friction Brake			
Mr. Maciej Mlodzikowski , Mr. Damian Banach, Dr.-Ing. Tomasz Orłowski Lumag sp z o. o. Poland			
		15:40 - 16:10	Break – Exhibition Hall

Technical Programme

Wednesday 22 May 2019

16:10 - 17:50 Technical Sessions		
CGN - Creep-Groan Noise	RBS - Rail Brake System and Components	RMA - Raw Materials
<p>Chair: Dr.-Ing. Angelo Sardá Continental Corporation</p> <p>Co-Chair: Mr. Joachim Noack ZF Group</p>	<p>Chair: Dr.-Ing Tim Hodges FM Motorparts</p> <p>Co-Chair: Mr. Franck Poisson SNCF</p>	<p>Chair: Prof. Dr. Jayashree Bijwe ITT Delhi</p> <p>Co-Chair: Mr. Fernao Persoon Lapinus</p>
<p>EB2019-SVM-042 </p> <p>Investigation of Creep Groan Mechanism Using Different Scale Characterization Techniques</p> <p>Dr. Agusti Sin ITT Friction Technologies Italy</p>	<p>EB2019-EBS-026 </p> <p>Regenerative braking on TALENT 3 Battery Electric Multiple Unit Train (BEMU)</p> <p>Mr. Manohar Singh Bombardier Transportation United Kingdom</p>	<p>EB2019-MDS-015 </p> <p>Exploring the Possibility of Replacing Copper in Nao Brake-Pads with Different Grades of Stainless Steel Powders</p> <p>Mr. Navnath Kalel, Prof. Dr. Jayashree Bijwe, Dr. Ashish Darpe IIT, Delhi, India</p>
<p>EB2019-FBR-021 </p> <p>ODS of Fixed Calliper Brake and Double Wishbone Axle During Creep Groan at Corner Test Rig</p> <p>Dipl.-Ing. Manuel Pürscher, Prof. Dr.-Ing. Peter Fischer Graz University of Technology Austria</p>	<p>EB2019-SVM-017 </p> <p>Dynamic Air Consumption Simulation at The Train Level</p> <p>Dr. Evgeny Tassart, Mr. Steeve Penel, Mr. Francesco Paolo Fumarola ALSTOM France</p>	<p>EB2019-MDS-002 </p> <p>A Comparison Between Tin and Antimony Sulphides Tribolayers</p> <p>Dr. Roberto C. Dante, Ing. Edoardo Cotilli, Mr. Michael Conforti, Ing. Mario Cotilli Quartz S.r.l.s.u.</p>
<p>EB2019-IBC-018 </p> <p>Development of Regenerative Brake Control Strategy to Remove Brake Rust for Improve Creep Groan Nosit and Linearity of Brake Feel</p> <p>Ms. Sora Jang Hyundai Motors Company Republic of Korea</p>	<p>EB2019-IBC-023 </p> <p>Research Project: Investigation of The Conditions for a Widespread Use of Eddy Current Brakes</p> <p>Ms. Silvia Eickstaedt DB Systemtechnik GmbH Germany</p>	<p>Ing. Fabio Squadrani Applus Idiada Group, Italy</p> <p>Mr. John O'Leary IDIADA Automotive Technology UK Ltd. United Kingdom</p>
<p>EB2019-SVM-013 </p> <p>Dynamics of Air Brake Actuation System Under Creep Groan Excitation</p> <p>Ing. Angel Sanchez, Dr. Eng. Juan J. Garcia-Bonito, Ing. Jose Lapresta, Ing. Narcís Molina, Ing. Fabio Squadrani Applus IDIADA Spain</p>	<p>EB2019-MDS-031 </p> <p>State of the Art of and New Challenges for Composite Brake Blocks</p> <p>Mr. Gerrit Streit DB Systemtechnik GmbH Germany</p>	<p>EB2019-MDS-012 </p> <p>Chemical Effects of Titanate Compounds on the Friction Surface</p> <p>Ms. Emiko Daimon, Mr. Yasuhito Ito Otsuka Chemical Co., Ltd., Japan</p>
<p>EB2019-FBR-026 </p> <p>Experimental Characterization of Brake Lining Material for Groan Noise Propensity</p> <p>Dr.-Ing. Davide Tonazzi, Ing. Alessandro Lazzari, Prof. Dr.-Ing. Francesco Massi University of Rome LA SAPIENZA</p> <p>Ing. Giovanni Conidi, Ing. Cristian Malmassari, Ing. Andrea Cerutti BREMBO, S.p.A., Advanced R&D Department Italy</p>	<p>EB2019-MDS-027 </p> <p>The Effect of Binder Variations on the Friction Materials Properties and Pressing Process</p> <p>Mr. Pablo Monreal, Dr.-Ing. Uwe Wienstroth, Dr. Jorge González, Mrs. Teresa Rouzaut ICER Rail - Knorr Bremse Spain</p>	<p>EB2019-MDS-014 </p> <p>Tin Sulfide Substitution Through Modification of Oxidation Properties of Synthetic Sulfides</p> <p>Dr. Carlos Lorenzana, Mrs. Gabriela Macías Benalcázar, Mr. Miguel Ángel Sanz Montero RIMSA Metal Technology, Spain</p>
		<p>EB2019-MDS-016 </p> <p>Potassium Titanate in Copper-Free Nao Brake-Pads - Critical Dependence of Performance Properties on Shape, Crystalline Structure and Method of Synthesis</p> <p>Mr. Harsh Gupta Noble Alchem Private Limited</p> <p>Mr. Vishal Mahale, Mr. Navnath Kalel, Mr. Umesh Marathe, Prof. Dr. Jayashree Bijwe IIT, Delhi, India</p>

18:00 – 19:00 EuroBrake Drinks Reception – Terrace Level

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19:00 – 22:30 EuroBrake Dinner – Terrace Level

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Technical Programme

Thursday 23 May 2019

08:30 - 10:10 Technical Sessions		
BE2 - Brake Emissions: Fundamentals and Innovation	RBT - Rail Brake Testing and Simulation	RTE - Brake Rotors: Thermal Effects
<p>Chair: Mr. Carlos Agudelo Link Engineering Co.</p> <p>Co-Chair: Dr. Hiroyuki Hagino Jari</p>	<p>Chair: Prof. Raphael Pfaff FH Aachen</p> <p>Co-Chair: Prof. Dr. Jiliang Mo Southwest Jiaotong University</p>	<p>Chair: Dr. Marko Tirovic Cranfield University</p> <p>Co-Chair: Dr. Enda Claffey Bentley</p>
<p>EB2019-FBR-028 </p> <p>A Pin-On-Disc Study on The Friction, Wear and Airborne Particle Emission from Recycled Brake Pad Material</p> <p>Dr. Yezhe Lyu, Dr. Jijie Ma, Prof. Dr. Jens Wahlström, Prof. Dr. Ulf Olofsson KTH Royal Institute of Technology Sweden</p> <p>Ms. Mara Leonardi, Prof. Dr. Stefano Gialanella University of Trento Italy</p>	<p>EB2019-IBC-017 </p> <p>Electronic Emulation of Pneumatic Braking Functions for Railways Applications</p> <p>Ing. Fabio Ferrara, Ing. Roberto Tione, Ing. Angelo Grasso, Ing. Marco Fasolini Faiveley Transport - a Wabtec company Italy</p> <p>EB2019-SVM-016 </p> <p>Numerical Investigation of The Effect of Brake Pad Structures on Squeal Instability and Wear Behaviour of Railway Disc Brake System</p> <p>Prof. Dr. Jiliang Mo, Mr. Dongwei Wang, Prof. Dr. Zhongrong Zhou Southwest Jiaotong University</p> <p>Mr. Cairang Shijia, Mrs. Peifang Wu Beijing Tianyishangjia New Material Corp., Ltd. China</p> <p>EB2019-SVM-021 </p> <p>Advantages of Complex Railways Brake Systems Validation Using an Extensive Hardware in the Loop Approach</p> <p>Ing. Federico Astengo, Ing. Antonio Buonanoce Faiveley - Wabtec Italy</p> <p>EB2019-SVM-034 </p> <p>Development of a Regenerative Friction Model to Enhance Braking Simulation with the Multibody Software VOCO</p> <p>Dr. Eng. Moncef Toumi, Mr. Mohammed Bouallaga Railenium</p> <p>Mr. Michel Sebès, Dr. Hugues Chollet IFSTTAR</p> <p>Dr. Eng. Karl Laden Bombardier Transportation France</p> <p>EB2019-IBC-009 </p> <p>Braking Curve Prediction from Observed Deceleration Performance</p> <p>Prof. Dr. Raphael Pfaff, Prof. Dr.-Ing. Ingo Elsen, Prof. Dr.-Ing. Bernd D. Schmidt FH Aachen University of Applied Sciences Germany</p>	<p>EB2019-SVM-008 </p> <p>A Further Understanding of Brake Disc Thermal Simulations under an Emergency Stop</p> <p>Dr. Qianjin Yang, Mr. Baozhi Zhang, Mr. Liqiang Song, Ms. Hui Yu, Mr. Fulin Gai Yantai Winhere Auto Parts Manufacturing Co., Ltd China</p> <p>EB2019-FBR-010 </p> <p>Disc Thickness Variation Measurement Under Operational Cold and Hot Brake Judder Conditions</p> <p>Mr. Bernat Ferrer, Mr. Fabio Squadrani Applus IDIADA Spain</p> <p>EB2019-SVM-010 </p> <p>A Lumped Parameter Thermal Network for Calculating the Brake Disc Temperature for High Power Tests and Downhill Brake Applications</p> <p>Mr. Manuel Arnold Daimler AG Germany</p> <p>EB2019-SVM-019 </p> <p>Simulation Study on the Thermomechanical Behaviour of AL-MC Automotive Brake Discs</p> <p>Dr. Samuel A. Awe, Mr. Adam Thomas, Mr. Anders Eklund, Mr. Nicholas Zervos Automotive Components Flöby AB Sweden</p> <p>EB2019-SVM-031 </p> <p>Brake Cooling Modelling & Correlation</p> <p>Mrs. Dilek Bayrak Akça, Mr. Yasin Hacisalihoglu, Mr. Cenk Dinç Ford Otosan Turkey</p>
<p>EB2019-EBS-014 </p> <p>The Brake Dust Particle Filter for Fine Dust Reduction</p> <p>Mr. Lukas Bock, Dipl.-Ing. Markus Kolczyk, Dipl.-Ing. Richard Drummond, Dr. Gunnar-Marcel Klein, Dr. Martin Lehmann, Dipl.-Ing. Thomas Jessberger, Dipl.-Ing. Volker Kümmerling, Dipl.-Ing. Eric Thébault, Dipl.-Ing. Andreas Beck MANN+HUMMEL GmbH, Germany</p> <p>EB2019-EBS-022 </p> <p>Brake Particle Formation and Behaviour in Frictional Contact</p> <p>Ms. Katharina, Julia, Johanna Lammel BMW / TU Ilmenau</p> <p>Prof. Dr.-Ing. Klaus Augsburg TU Ilmenau</p> <p>Mr. Rasmus Leicht BMW, Germany</p> <p>EB2019-EBS-011 </p> <p>Establishment of Brake Wear Emission Analysis Techniques</p> <p>Mr. Shigetomo Suzuki Akebono Brake Industry Japan</p> <p>EB2019-EBS-021 </p> <p>Investigation of the Potential of Regenerative Brake Systems regarding Brake Particle Emission Reduction</p> <p>Dipl.-Ing. David Hesse, Prof. Dr.-Ing. Klaus Augsburg TU Ilmenau Germany</p>		
10:10 - 10:40 Break – Exhibition Hall		

Technical Programme

Thursday 23 May 2019

EuroBrake 2019 Strategy Panel

How will the brake industry solve the challenge of brake emissions - by changing the brake design, the brake operation, or both?

10:40 – 12:20



Chair:
Dr.-Ing Georg Ostermeyer
TU Braunschweig



Chair:
Jan Münchhoff
AUDI AG

Brake emissions have been the subject of intensive discussion in various circles for years; more and more specialists are taking part in the discussion and looking for ways to optimize the vehicle braking system in order to minimize emissions. But the world around us is changing fast in evolutionary and even revolutionary ways.

On the one hand, new materials and highly automated subsystems for the friction brake are being developed in an evolutionary manner. Scientists understand the chains of interactions and their influences better and better.

On the other hand, highly automated vehicles are no longer science fiction; fully electrified vehicle concepts with recuperative braking are achieving more and more market share, and the use of brakes is thus changing in a revolutionary way.

This strategy panel discussion involving leading industry and academic experts will include consideration of the following:

- How concrete and influential are all these effects on the challenge of brake emissions?
- What opportunities and risks are to be expected in brake development over the next few years?
- Where will be the research and development topics of science and industry tomorrow?

We will discuss these issues with our high-caliber panel of top experts and visionaries, making strategic issues transparent for all and supporting follow-up discussions during and after EuroBrake2019.



Technical Programme

Thursday 23 May 2019

10:40 – 12:20	Technical Sessions	13:20 - 15:00	Technical Sessions	FMC - Friction Material Characterisation	
ADT - Advanced Dynamometer and Vehicle Testing		EMB - Electromechanical Brakes			
Chair: Mr. Michael Schog ZF		Chair: Mr. Alessandro Monzani Brembo S.p.A.		Chair: Dr. Augusti Sin ITT Friction Technologies	
Co-Chair: Mr Torsten Speier Link Engineering Co.		Co-Chair: Mr. Jan Münchhoff AUDI AG		Co-Chair: Mrs. Anne-Lise Cristol University of Lille	
EB2019-SVM-011	Friction Performance Testing using Scaling Laws Mr. Rohit Jogineedi , Mr. Shanthan Reddy Mandadi, Mr. David McKavanagh, Prof. Peter Filip, Southern Illinois University Carbondale Dr. Steven Shaffer Bruker Nano Surfaces United States	EB2019-FBR-020	Layout of Electrical Parking Brake Systems based on Field Use-Cases Dipl.-Ing. Olaf Metzler , Dr.-Ing. Marcus Schumann, Dr.-Ing. Gunther Seipel, Dipl.-Ing. Wiebke Wienands Continental Teves AG & Co. oHG Germany	EB2019-FBR-027	Analysis of the Thermal Effect on Mechanical and Chemical Properties of a Friction Material Diego Severo Antunes , Juliana Favero, Natalia Pagnoncelli Lorandi, Ricardo Gilberto Lamb Fras-le S.A. Brazil
EB2019-SVM-028	Reduced Scale Brake Tester with Realistic Inertia Effects of Cars Prof. Dr.-Ing. Georg-Peter Ostermeyer, Mr. Stephan Raczek, Mr. Jan Malte Sandgaard TU Braunschweig Germany	EB2019-EBS-030	Image Segmentation and Object Tracking in Video in Real Time For Intelligent EMB (Electro Mechanical Brake) Dr. Abdessamed Ramdane Chassis Brakes International France	EB2019-MDS-001	Non-Asbestos Organic (NAO) Disc Pad Wear Behaviour: Divergence of Pad Thickness Loss from Pad Weight Loss Mr. Meechai Sriwiboon , Mr. Nipon Tieampaan, Ms. Kritsana Keawlob Compact International (1994) Co.,Ltd. Thailand
EB2019-SVM-018	Hybrid Vehicle Simulation in Brake Dynamometer Testing by H.I.L. Mr. Michele Salvai TecSA s.r.l. Italy	EB2019-SVM-014	A Study of EPB Operational Noise Reduction Method Mr. Yuhei Miyakoshi , Mr. Hiroshi Takagi ADVICS CO., LTD. Japan	EB2019-MDS-021	Comparison on Melting Characteristics of Resin by Rheometer Mr. Takao Tanaka , Ms. Michiko Ishiguro, Mr. Tomoaki Natsume Nisshinbo Brake Inc. Japan
EB2019-MFM-003	Method for Extracting the Main Spectrum of Friction Materials Behaviour (Batch To Batch Control) Using a New Scale-Dynamometer Specification Kang Li , Otto Schmitt Zhuhai Glory Friction Material Co., Ltd. China	EB2019-FBR-023	Electrical Parking Brakes (EPB) – Considerations in the design of brake Shims from a NVH performance and durability perspective, especially in cold conditions. Mr. Johan Stjärndahl, Mr. Mats Eliasson, Mr. P-A Jarnestrom Trelleborg Sealing Solutions Kalmar AB Sweden	EB2019-SVM-005	Advantages of Improved Material Damping Handling for Brake System Simulation with Optimization Dr.-Ing. Michael Klein INTES GmbH Germany
EB2019-MDS-010	Effect of Sub-Frame Boundary Conditions on Vehicle Judder Performance Dr. Eng. Juan Garcia , Ing. Bernat Ferrer, Ing. Oriol Calvo, Ing. Fabio Squadrani Applus IDIADA Spain	EB2019-MFM-008	The Journey of The Secrets - Cyber Security Industrialization Concept for Electronic Brake Systems Dipl.-Ing. Stephan Henkel , Mr. Dennis Kutschke, Mr. Michael Gerhard Schneider Continental Teves AG & Co oHG Germany	EB2019-SVM-015	Damping Specifications of Vehicle Brake Components Based on Simulative and Experimental Investigations Mr. Philipp Diel , Mr. Steffen Horwath, Mr. Christian Rausch, M Plan GmbH, Mr. Hans-Peter Klatt Hans-Peter Klatt engineering dynamics Germany
12:20 - 13:20	Lunch – Exhibition Hall				

Technical Programme

Thursday 23 May 2019

13:20 - 15:00	Technical Sessions	15:20 - 16:40	Technical Sessions	NVH - NVH Test and Reduction Methods	
LBR - Lightweight Brake Rotors		FMF - Friction Material Formulation			
Chair:	Dr.-Ing. Matthias Leber Porsche AG	Chair:	Dr.-Ing Hans-Günther Paul Akebono Europe	Chair:	Mr. Claus Thomas Porsche AG
Co-Chair:	Mr. Paolo Pizzolato Brembo S.p.A	Co-Chair:	Dr. Raffaele Gilardi Imerys Graphite & Carbon	Co-Chair:	Dr. Jean-François Brunel University of Lille
EB2019-MDS-007	Brake Disc Coatings: Evaluation of the Mechanical Properties, Life and Brake Performance Mr. Prasad Arun Kumar, Mr. Shinde Babasaheb, Mr. Tiwari Shashank Mahindra & Mahindra, India	EB2019-MDS-041	Exploration of Thermoplastic Polymers as a Possible Replacement of Phenolic Resin in Friction Materials Prof. Dr. Jayashree Bijwe IIT, Delhi India	EB2019-EBS-013	Upcoming Requirements for NVH Testing and Development in the Light of Electrified Vehicles and Autonomous Driving Ms. Meike Dorn, Dr. Nils Perzborn ZF Group Germany
EB2019-MDS-008	Scalable Lightweight Concept for Composite Brake Discs with Steel Hub Made of Stamped Sheet Metal Dr.-Ing. Matthias G. Müller, Mr. Kamil Zawalich, Mr. Ulrich Lorenz Erdrich Umformtechnik GmbH Mr. Wilfried Strauß, Mr. Tobias Müller, Mr. Reiner Becker Fritz Winter Eisengießerei GmbH & Co. KG Germany	EB2019-MDS-029	Tribo Performance of Single and Multiwall Carbon Nanotube in the Disc Brake Pad Formulation Mr. Surya Rajan B, Mr. Sathickbasha K, Dr. Saibalaji M A S, Dr. Selvakumar A S, Dr. Rasool Mohideen S, Dr. Prince Arockia Doss B S Abdur Rahman crescent Institute of Science and Technology India	EB2019-FBR-013	Development Methods to Cope with Today's and Future NVH Challenges Dr.-Ing. Hiie-Mai Unger, Dr.-Ing. Milan Djurovic, Mr. Tilman Noack, Dr.-Ing. Achim Romer Robert Bosch GmbH Germany
EB2019-MDS-034	Wear Resistant Oxide-Ceramic Friction Surfaces for Brake Rotors Applied by Thermal Spray Processes Dipl.-Ing. Septimiu Popa, Prof. Dr. Rainer Gadow, Prof. Dr. Andreas Killinger IFKB University Stuttgart, Germany	EB2019-MDS-033	Comparison Between Two Different Routes for The Fabrication of Sintered Brake/Clutch Plates Dr. Jon Echeberria, Ms. Beatriz Perez CEIT Spain	EB2019-IBC-003	The Reduction Technology of Automobile Brake Noise by Piezoelectric-Based Dither Control Mr. Jaekeun Hwang Hyundai Motor Company/Brake Performance Development Team Republic of Korea
EB2019-MDS-032	Dry Sliding Wear and Fe Contamination of Investment-Cast SIC Foam Reinforced Aluminium Matrix Composites Mr. Guilherme Volpato, Prof. Dr.-Ing. Márcio Fredel Federal University of Santa Catarina Brazil Prof. Dr.-Ing. Ulrich Tetzlaff Technische Hochschule Ingolstadt Germany	EB2019-MDS-025	High Performance Brake Pads Studied on a Dyno, With and Without Fly Wheels Dr. Nico Langhof, Dipl.-Ing. Thorsten Balzer, Dr.-Ing. Stefan Flauder, Prof. Dr.-Ing. Walter Krenkel University of Bayreuth Germany	EB2019-EBS-009	Experimental Study on Steering Brake Squeal Based on Vehicle Road Test Mr. Ming Song, Mr. Xuegui Yu Shanghai Automotive Brake Systems Co, Ltd, Mr. Bo Kuang, Continental Brake Systems (Shanghai) Co, Ltd China
EB2019-EBS-012	Lightweight Metal-Ceramic Hybrid Brake Disc for Electric-Powered Vehicles: Concept and Prototype Dipl.-Ing. Thorsten Balzer, Dr. Nico Langhof, Dipl.-Ing. Reinhard Hackenschmidt, Prof. Dr.-Ing. Frank Rieg, Prof. Dr.-Ing. Walter Krenkel University of Bayreuth, Germany				
15:00 - 15:20	Break - Exhibition Hall				

15:20 - 16:40

Technical Sessions

FMG – Fundamentals: General

Chair: **Prof. Dr. Peter Fischer**
Graz University of Technology

Co-Chair: **Prof. Dr.-Ing. Hartmut Hetzler**
University of Kassel

EB2019-MDS-018

Interplay Between Composition and Electrochemical Performance at the Pad-Disc Interface

Dr. Federico Bertasi,
Dr. Alessandro Mancini, Dr. Andrea Bonfanti
Brembo Spa
Italy

EB2019-FBR-009

Residual Drag Due to Pad Suction

Mr. Florian Weichert,
Mr. Andrea Mezzabotta, Mr. Max Votteler,
Mr. Johannes Mühlberger,
Mando Corporation Europe GmbH
Germany

EB2019-FBR-018

A Study on Piston Retract Mechanism by using Phenolic Piston

Mr. Naohiro Yoshizawa
Sumitomo Bakelite co., Ltd.
Japan

EB2019-MDS-006

Metal Sulfide Coated Fibers - Bringing Solid Lubricants to The Contact Plateau

Christian Schmied,
Dr. Carmen Moser, Mr. Herbert Kienleitner
Tribotecc GmbH
Austria

16:40 - 18:00

EuroBrake Farewell Reception – Exhibition Foyer



The Official EuroBrake 2019 App

The EuroBrake 2019 app is available from the main app stores, absolutely free.

Included on the app:

- Complete EuroBrake schedule
- Full Technical Programme
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- All technical paper abstracts
- A live activity feed and programme updates
- Interactive exhibitor floor plan
- Personalised delegate profiles
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Exhibition Floor Plan

Exhibition hours

Tuesday 21st May 14:00-19:30

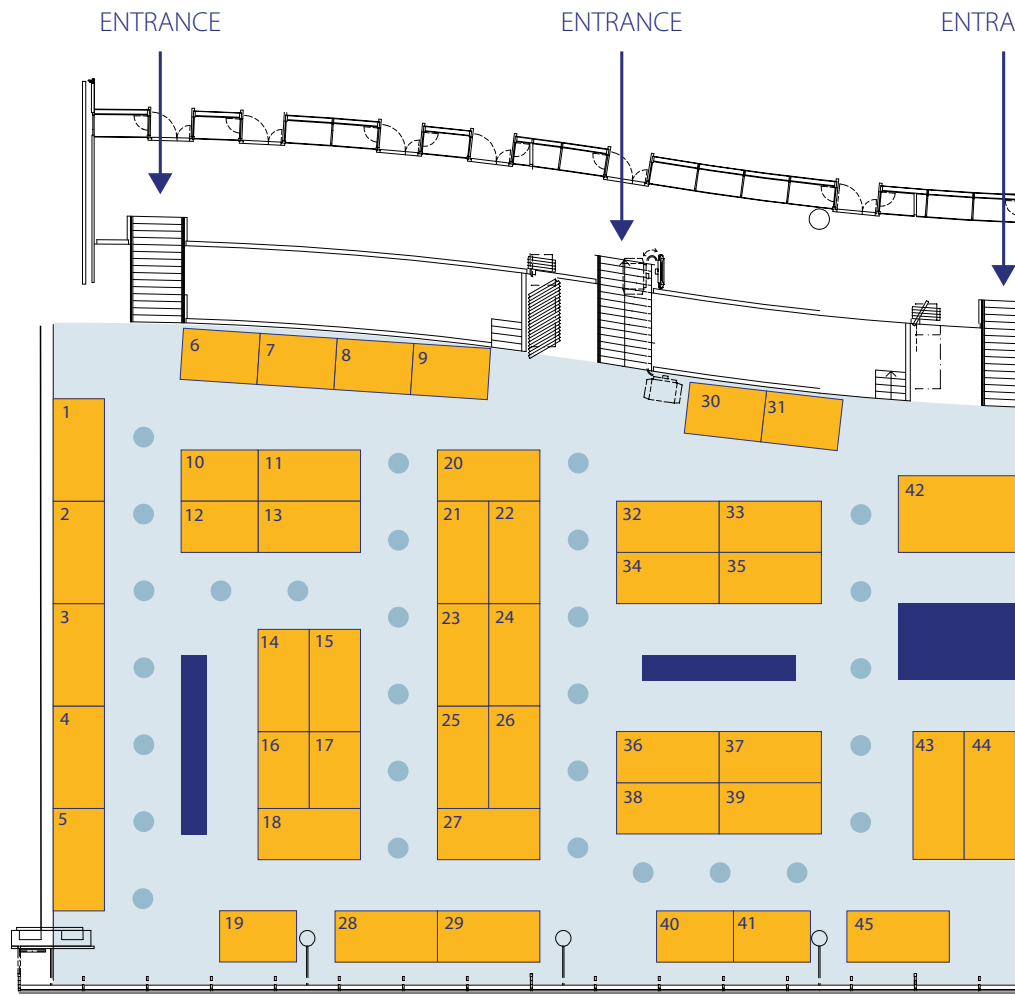
Wednesday 22nd May 08:30-18:00

Thursday 23rd May 08:30-16:40

Refreshments and lunches are served in the Exhibition Hall.

Floor plan accurate at time of printing. Visit www.eurobrake.net/exhibitors for the most current version.

An updated floor plan will be printed in the Final Programme.



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Exhibitor Directory

Alroko GmbH & Co KG

Germany
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Email: mail@alroko.de
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Alroko is the exclusive sales representative for many important producers of industrial raw materials and machine manufacturers around the world and a reliable partner for all our customers. Our sales philosophy is to supply technically advanced products of constantly high quality, always emanating from the same established sources. Furthermore, we supply a variety of machines, mainly for producing and testing friction materials. More than 30 years of experience in our business field and the manufacture of nearly all products according to ISO-standards provide our customers with the security of supply and trust they need to produce excellent products themselves. We can also give you extensive technical advice as required.

Booth: 15
Week-at-a-glance Sponsor

Anhui Guida Auto Parts Co

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Website: www.gdbreakes.com



Anhui Guida Auto Parts Co, Ltd. (hereinafter called Guida) was established in 2010, located in the "National Auto Parts Export Processing Base" – Machinery Industrial Development Zone. Guida mainly specializes in the production of backing plate, brake steel shoe and related accessories. The products are sold all over the world.

Booth: 31

Applus IDIADA

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With over 25 years of history, Applus IDIADA is a leading engineering company providing design, testing, engineering and homologation services to the automotive industry worldwide. Applus IDIADA has more than 2,500 engineers specialized in vehicle development and an international network of subsidiaries and branch offices in 24 countries, ensuring its clients receive fast and customized services.

The headquarters, composed of a 360-hectare main technical centre which includes its own proving ground and a comprehensive set of laboratories, is located near Barcelona, Spain.

Applus IDIADA's brake systems department offers complete solutions for brake development projects worldwide. The main asset is the successful integration of design, simulation and testing capabilities which means maximum efficiency in cost and time.

Booth: 42
Diamond Sponsor

Atotech Deutschland GmbH

Germany
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Website: www.atotech.com



Atotech is one of the world's leading manufacturers of specialty chemicals and equipment for the printed circuit board, IC-substrate and semiconductor industries, as well as for the decorative and functional surface finishing industries.

Atotech has annual sales of USD1.2 billion (2017). The company is fully committed to sustainability – we develop technologies to minimize waste and to reduce environmental impact. Atotech has its headquarters in Berlin, Germany, and employs about 4,000 people in over 40 countries.

Booth: 85

Automotive Components Floby AB

Sweden
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Automotive Components Floby was founded 1957 and delivers parts such as brake discs, wheel hubs and connecting rods to manufacturing companies all over the world. Driven by key values of knowledge and tradition, all the company's products are manufactured according to the industry's highest standards in quality, precision and environmental impact. To further optimize the process for each product, AC Floby technicians work closely with customers to provide expert support and smooth workflow. AC Floby employs 563 staff - mainly in Sweden - and opened a Shanghai operation in September 2018.

Booth: 25

Beijing Tianyish New Material Corp

Information to follow

Booth: 84

Blum-Novotest GmbH

Germany
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Website: www.blum-novotest.com



Blum-Novotest – a global leader in technology and innovation in measuring and testing technology. A reliable partner to the global machine tool, automotive and aerospace industries. The specialist area of the measuring machines business division includes dimensional, geometry and crack testing primarily on rotationally symmetric components. Using tactile, non-contact as well as combined procedures, the service spectrum ranges from integrated post-process solutions to static and dynamic measurement and all the way to autonomous systems. Optional supplementary testing is possible, for example, for cracks, hardness or natural frequency.

Booth: 45

Brüker Nano Surfaces

France
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Brüker is a global leader in design and manufacturing of high-performance measurement and characterization equipment. Our 3D optical microscopes and profilers, based on more than 30 years of Wyko™ technology, provide the flexible imaging and measurement capabilities for comprehensive, accurate characterization of surfaces. Brüker's UMT mechanical testers are comprehensive and versatile systems for investigating tribology — friction, wear, load, hardness, and lubrication. Our metrology and test solutions help engineers and manufacturers better understand how their materials and parts will perform in real-world applications.

Booth: 27

BSS Tec International Corporation

Taiwan
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BSS TEC is a professional braking components manufacturer which originally focused on fine backing plates. With a customized progressive press and an experienced, professional team we created the BSS Stamping technology to manufacture the fine backing plates. In 2017, we expanded our scale and acquired a shoe core company which has more than 40 years of experience and the widest range in Taiwan. With our innovation and professional ability, we never stop improving ourselves and pursuing the highest quality in both products and customer service. Our vision is to work with our partners and become the most competitive suppliers in the brake industry and together with our partners provide precise and reliable products.

Booth: 73

CAME SRL

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Leading company in sales and distribution of specialty chemicals. We represent major global producers of raw materials for different application. Our focus is the presence in the friction and sintering marketing worldwide.

Booth: 52

Cardolite Specialty Chemicals Europe NV

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Cardolite Corporation is a privately held developer and manufacturer of the world's largest variety of products derived from cashew nutshell liquid (CNSL), a renewable natural resource. The unique properties of CNSL are used to develop and produce a wide range of products to service the coating, friction material, adhesive, composite and foam markets.

At Eurobrake Cardolite will be presenting its latest innovations for the friction materials industry. Think high performance brown friction particles based on high purity cardanol that offer superior properties at minimal cost and radical acid free black particles to minimize stiction and corrosion and related issues.

Booth: 12

CeramTec GmbH

Germany
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Email: info@ceramtec.de
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Your Brake Parts - Our Competence in Machining and Materials

SPK Cutting Tool Division of CeramTec GmbH can call on their knowledge and experience of high-performance machining of cast iron especially in the brake industry for nearly 60 years. These are the best qualifications for solving the whole range of machining tasks with optimal cutting tools and best in class cutting materials based on ceramics and PCBN. Our machining competence and application of cutting tools is not limited to brake parts only. It is comprising turning, milling and boring tasks of components made from a wide range of materials: - Grey cast iron, - Ductile cast iron - Compacted graphite iron - Hardened steels - Chilled cast iron - Super alloys and aerospace materials. With all our engineering services and cutting tool solutions, our main objective is to raise your productivity up to the high-performance level. The creation of individual, innovative and efficient machining solutions is our area of expertise.

CeramTec is a competent partner for ceramic materials such as oxide, nitride and ceramic carbide materials and components for numerous technical applications. The material and process development for the production of Al-MMC-materials with high ceramic content (30-50 v%) is currently in progress. A material with silicon carbide as ceramic component could be interesting for applications as MMC-brake disc.

For further information, please contact info@ceramtec.de

Booth: 83

Exhibitor Directory

COMEC Grinding Machines & Presses

Italy
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Email: comec@comec-grinders.com
Website: www.comec-grinders.com



Founded in 1963, COMEC specializes in the design and manufacturing of grinding machines for special applications. In the last 30 years, COMEC focused especially on developing Grinding & Pressing Technologies for the Friction Material Industry.

Because of the excellent technological solutions, developed through both internal research & development and working side by side with its customers, COMEC is a top leading supplier worldwide of grinding machines for friction materials.

We are continuously improving the design of our machines to study and propose to the friction market state-of-the-art grinding and pressing solutions for the disc brake pads, truck linings and brakes shoes production.

COMEC is located about 60 km South East of Milan, in northern Italy, within 45 to 90 minutes' drive from the Milan airports.

Booth: 59

Daico Automotive Products S.p.A.

Italy
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Website: www.daicospa.com



DAICO AUTOMOTIVE PRODUCTS S.P.A. is the European leading Company, manufacturer and distributor of brake hardware for Automotive Industries and brake industries, since 1987. Products: components and accessories for disc and drum brake systems and for brake calipers. Application: Passenger Cars, L.C.V. and C.V.

Product range: - Brake pad and brake caliper hardware for passenger vehicles: piston clips, wire springs, acoustic wear sensors, counterweights, etc. - Brake caliper hardware: sliding pad clips (abutment clips), fitting kits, bolts, etc. - Fitting kits for L.C.V. and C.V. brake pads: hold down kits, pressure distribution springs, hold down plates, etc. - Components for drum kit assy: adjuster links, adjusting levers, springs, etc. - Electrical wear sensors (under the brand name of Cable Logic S.r.l.).

Production: over 50% with final destination O.E. or O.E.S.

Booth: 82

Daishin Kako Co., LTD

Japan
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Daishin Kako Company Ltd is based in Tokyo and has over fifty years' experience of designing, manufacturing and continuously developing lubricating products for highly specific applications. One of those applications in which Daishin's expertise lies, is in the field of automotive brake squeal reduction. Daishin has been studying the use of greases and other lubricating materials used for the prevention of brake noise and squeal for over forty years. Daikalub 528D is the latest development in the range of brake greases and is approved and used by many automobile manufacturers and component suppliers around the world. Daikalub 528D has been designed with the three main principles of Durability, Damping and De-Coupling combined into one material which has been shown to offer great improvements under the SAE2521 test specification by a very large number of international and independent bodies, including auto manufacturers and calliper suppliers and pad manufacturers.

Booth: 71

ANOTHER DAY IS BREAKING.

AND WE KNOW WHAT IT LOOKS LIKE.

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ac AUTOMOTIVE COMPONENTS **FLOBY**

Discover next generation's brake components in **BOOTH 25.**

Exhibitor Directory

Dekati Ltd

Finland

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Dekati Ltd. is a world leader in designing and manufacturing innovative fine particle measurement solutions. We have over 25 years of experience in providing measurement instruments and complete measurement solutions to a wide variety of environments and sample conditions. We take pride in the quality and robustness of our products and are committed to finding the best possible solution for your aerosol measurement needs. Our experience and expertise in aerosol measurement applications is at your disposal throughout the lifecycle of your investment via our global partner network. All Dekati® Products are developed and manufactured in Finland and are available with up to five-year warranty.

The highlights of our product line include the ELPI®+ product family that enables real-time measurement of particle size distribution in up to 500 size channels 6 nm-10 µm. ELPI®+ products also always include the option for post-measurement chemical analysis of the size classified, collected samples. The High Temperature version of the ELPI®+ additionally allows direct measurement of up to 180 °C aerosol sample without the need to cool the sample. In addition to the ELPI®+ instruments, Dekati® Product Line includes several other instruments for both particle detection and aerosol sample conditioning and dilution. Visit us in the exhibition area to learn more about Dekati® Measurement Solutions!

Booth: 48

EIRICH

Germany

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Email: eirich@eirich.de

Website: www.eirich.com



EIRICH develops and manufactures machines and equipment for industrial processing technology with processes such as granulation, drying and, in particular, mixing and fine grinding. Depending on the industry, the family enterprise offers its customers stand-alone machines with process peripherals right through to turnkey processing plants. The company has been operating in industrial mixing technology for over 100 years. The portfolio includes mixers for industrial applications with a volume of 1 to 12,000 l as well as lab mixers. As a technology leader for intensive mixers, EIRICH provides solutions to more than 300 industries. For friction lining mixes and sealing compounds, EIRICH mixing technology offers outstanding advantages for the preparation of dry mixes, wet mixes and granules. EIRICH customers tell from experience, that with this unique technology no step-by-step raw material addition is necessary, an optimal separation of synthetic, metal or mineral fibers is guaranteed and permanently homogeneous reproducible mixes of high quality are provided

Booth: 75

Erdrich Umformtechnik

Germany

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Erdrich Umformtechnik is one of the world's leading manufacturers of metal brake pistons and specific foundation related parts for the automotive industry. The Business Unit Brake Piston has facilities in Germany, Czech Republic, Georgia/USA and China producing several 10 Mio. pistons per year with a global footprint. The piston portfolio comprises diameters from 36 to 66 mm for front and rear axle applications. All pistons are optimized to minimum weight at maximum strength using our enhanced deep drawing process technology. Ni/Cr-coatings have been replaced to a more sophisticated and environmental gas-nitro-carbureting. Utilising completely interlinked production lines including in-house surface treatment Erdrich Umformtechnik is achieving the quality aim - 0 ppm for years and is delivering to customer locations all over the world.

Booth: 19

ERLMANN GmbH & Co. KG

Germany

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ERLMANN – we are one of the world's leading manufacturers of drilling and grinding machines for the major friction material producers! Whether standard machines or customer-specific solutions – our quality convinces!

For more than 60 years our products have been valued by the major friction material producers world-wide. The company has been founded in 1955 by the Engineer Ferdinand Erlmann. Due to his former activities he had best contacts to the Brake Lining and Clutch Facing Industry in Germany so that he could get a good overlook of their requirements. He developed efficient production technology for drilling of brake linings and clutch facings. To fulfil the demand of our customers he designed as well Hand Drilling Jigs for a low production rate as automatically working machines for economic drilling of big runs.

In 1972 Ferdinand Erlmann incorporated a partnership with Rolf Stratmann and in 1987 he retired – meanwhile 70 years old. Rolf Stratmann assumes the complete participations. 2007, 65 years old, he assigned the company to Dipl. Ing. Gerd Schorn and he continued with the business. Beside of our standard machinery program several special purpose machines have been built according to the requirements of our clients. Since 2008 we also produce grinding machines with diamond wheels for brake linings.

Our Engineering department persistently develops the machines with high precision components according to the newest technology.

The requested quality regulations for the original equipment of the most important motorcar and axle producers as DAIMLER CHRYSLER, VW, GENERAL MOTORS, DAF, DANA, BERGISCHE ACHSEN, MAN, MERITOR, ROCKWELL, SCANIA, FRUEHAUF, LEYLAND, VOLVO, PEGASO, KAESSBOHRER, IVECO a. s. o. will be completely fulfilled. As producer of high quality machinery on a small and specialised market a personalised service to our customers is the first priority for us.

Booth: 64 & 65

FISITA

United Kingdom

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Website: www.fisita.com



FISITA is the international federation that brings together the global automotive mobility sector to share ideas and advance automotive technological development. Founded in 1948, we are uniquely placed to promote excellence and support the development of safe, sustainable and affordable mobility solutions.

FISITA enables automotive engineering societies and corporate organisations to connect with each other, network, share technological advancements and collaborate. Since creation, FISITA has seen significant growth in influence and relevance and today our network of Member Societies and corporate members of the Honorary Committee reach over 210,000 engineers in 37 countries, placing us at the heart of the industry.

FISITA facilitates dialogue between engineers and industry, governments, academia, and environmental and standards organisations, across all areas of automotive technology.

We are proud to be contributing at the forefront of education and learning through our Education Committee and other academic initiatives. As part of this strategic engagement, we support the professional development of engineers, while providing resources and opportunities for students and young engineers breaking into the profession. Through our various education initiatives, FISITA promotes the automotive mobility sector as a career pathway of choice and supports engineers throughout their career journey.

In addition to EuroBrake, FISITA organises the FISITA World Automotive Summit – an exclusive annual meeting of industry leaders, and the FISITA World Automotive Congress – a forum for industry experts, engineers and executives to exchange ideas and discuss the trends that drive the automotive industry forward.

Exhibition Foyer

Frimeco

Austria

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FRIMECO - High-quality raw materials for the global friction industry Since 1995, FRIMECO has been producing and marketing high quality materials for the international friction industry, supplying from our global manufacturing facilities to the whole world. FRIMECO products are used in friction linings in the automotive, railway, and industrial sectors. Among FRIMECO's many products, you will find synthetic and mineral metal sulfides as well as steel fibers, non-ferrous metal fibers and cashew-derived products. Materials are used worldwide in OE, OES, and AM applications.

Booth: 22

Fritz Winter

Germany

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The Fritz Winter Foundry is supplier and partner for the global automotive, commercial vehicle and hydraulic industry. We develop and manufacture rough and finish part components as well as complex system components, increasingly in light-weight design also.

With our innovative production concepts which we continuously develop further, we provide already today the mobility of tomorrow. Our material basis is sustainable as we use recycled iron as raw material for our High-Tech products. The self-conception of our company has always been the protection of our environment and its resources.

As a solid medium-sized family-owned company, Fritz Winter today is counted among the biggest independent iron foundries worldwide.

Booth: 54

Greening Inc.

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GREENING's dynamometers and test equipment and ISO certified testing services span a wide range of vehicle brake system and driveline components, including automobile, commercial vehicle, motorcycle, aviation, industrial, military, and marine applications. Our Detroit-based lab regularly conducts tests in accordance with SAE, JASO, ISO, and other industry and corporate procedures. Additionally, our long-standing experience in motorsports brake testing has assisted race teams across the world. GREENING-Europe in The Netherlands provides full service vehicle testing, qualified to perform ECE R90 and other test protocols for brake pads, shoes, discs and drums. We have extensive experience in assisting the brake industry with document submission to achieve ECE R90 certification through RDW (E4). GREENING's focused capabilities include servicing "in-house" testing labs with high-quality dynamometer fixtures, designed and manufactured to ensure proper test operation and to minimize data variation and errors. Put GREENING's experience to work for you!

Booth: 64 & 65

Exhibitor Directory

HEAD acoustics GmbH

Germany
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HEAD acoustics GmbH is one of the world's leading companies for integrated acoustic solutions as well as sound and vibration analysis. The company benefits from the combination of cutting-edge measurement technology with many years of practical experience in the industry. HEAD acoustics is receiving global accolades for its expertise and its pioneering role in the development of hardware and software for the measurement and analysis for the optimization of sound quality. Especially in the field of brake development HEAD acoustics offers ideal solutions to detect and record brake noise and vibrations as well as the relevant parameters. The core in this area is the Brake OBSERVER system which provides automatic detection of brake noise. The Relative Approach Algorithm developed by HEAD acoustics and once patented is based on the pattern recognition characteristics of the human ear and provides excellent detection results with respect to the noise-causing brake. To ensure a worldwide presence and availability, the German company has subsidiaries in France, Italy, Great Britain, China, Japan, South Korea and the USA and works closely with international sales partners.

Booth: 33
Drinks Reception Sponsor

HORIBA Europe GmbH

Germany
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Website: www.horiba.com



Shaping the automotive industry by developing promising and unique innovations – this is the core of all our activities. HORIBA Automotive Test Systems is your strong partner offering total solutions paired with unrivalled know-how and innovative spirit while being able to tailor each solution to customer-specific demands – from simple testing capacities to complex orders.

No matter which type of braking system is to be tested, the experienced team of Contract Test Engineers handles customers' requests using the latest measurement and testing technology for highly accurate and reproducible measurements. In addition to long-proven brake test solutions, HORIBA can now also provide you with a solution for Brake Dust measurement.

With over 60 years of experience and more than 40 companies worldwide, HORIBA ATS offers complete solutions with full turnkey capability. Thanks to decades of expertise in the fields of brake testing, HORIBA is a competent testing partner and provides its customers with the full range of test systems for all types of friction material and brakes application.

Booth: 35
Gold Sponsor - Conference Bags

IAG Industrie Automatisierungs GmbH

Austria
Telephone: +43 262 221 7340
Email: sales@iag.at
Website: www.iag.at



Your Specialist in innovative Friction Lining Technology Our friction lining presses are employed in the manufacturing of high-quality brake pads that fulfil every quality requirement specified by customers. Our customers, leading global players in the friction lining industry, need to continuously face new technological and economic challenges We offer hot and cold / short pressing technology according to your needs.

- Presses
 - Rotary type press - Stand-alone production machine for big lot sizes and mass production
 - Production Center - Up to 5 independents of each other acting round table machines with a central control and hydraulic power station for the flexible production of medium lot sizes.
 - Linear presses - The flexible solution to produce smallest lot sizes on 1 or 2 lines each with 6 independents of each other acting press cells. Production of up to 12 different references in fully automatic on one machine.
 - New modular linear press system with 120to
- Lab presses for your R&D activities in material and process development
- Curing ovens

Booth: 78

HEAD acoustics

VISIT US AT BOOTH 33

BrakeOBSERVER

The easy way to detect brake noise

www.head-acoustics.com

Exhibitor Directory

Imerys

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Telephone: +41 91 873 2010
Email: graphiteandcarbon.ch@imerys.com
Website: www.imerys-graphite-and-carbon.com/



Imerys is the world leader in mineral-based specialties for friction materials, delivering high value-added, functional solutions for both resin-bonded and copper-sintered brakes. The Group draws on its knowledge of applications, scientific expertise and technological know-how to offer solutions benefiting its mineral resources, produce synthetic minerals and develop formulations. Imerys thus contributes essential properties to customers' products and performance, such as minimum fade, low NVH, and wear resistance. Imerys meets ambitious criteria for responsible development, regarding social, environmental or corporate governance.

Booth: 81

IMF Engineering S.r.l

Italy
Telephone: +39 023 391 088 0
Email: info@imfeng.eu
Website: www.imfeng.eu/



Thanks to almost 20 years of experience in the friction industry, IMF ENGINEERING design completely automatic painting systems, consisting of: painting booth in stainless steel or in antistatic PVC, infrared or convection oven, both electric and gas, cooling systems. All elements are connected to each other in a few meters. The loading and unloading systems can be both robotic and manual, according to the customer's needs.

The painting booth is specifically designed for the brake pads which, together with the electrostatic powder coating equipment applied, allows to obtain a thinner and complete pad cover. We use and manage the most advanced powder coating application technologies, based on the electrostatic applications known as CORONA and TRIBO. Our curing ovens increase the adhesion to the metal support and its resistance to corrosion according to the strictest specifications of the OEM sector.

In the range of products offered to the friction industry, the heat treatment furnaces for the stabilization of the friction of the brake pads play an extremely important role. The safety of a good braking system comes from a performing heat treatment of the friction material, that is from its baking in the oven with well-defined and respected cycles, both in term of time and temperatures.

The ovens can be of the continuous type, with robotized loading and unloading, with fast short or longtime curing, mainly indicated for high production and specific for the OE. We also produce chamber ovens, developed over the years for the thermal treatments of the brake pads, best known and used in the After Market, with very long baking cycles and a lower production volume.

Booth: 62

Industrial Measurement Systems Inc

United States
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IMS, Inc. specializes in ultrasonic-based instruments for composite characterization. Our ETEK 3000 measures the complete set of elastic properties of friction materials (SAE J2725) which is essential for NVH simulation. The iETEK and Rapid iETEK instruments measure the dynamic modulus non-destructively. Applications include process development, NVH studies and quality assurance.

Booth: 17

Infra Tec GmbH Infrarotsensorik und Messtechnik

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Website: www.infrotec.de



The Dresden-based company InfraTec GmbH Infrarotsensorik und Messtechnik is a specialist for products and services in the field of infrared technology. It is active in all areas of thermographic applications, with its scope of performance ranging from the sales of thermographic cameras to the supply of thermal imaging systems and turn-key thermographic automation solutions. One of these solutions regarding the automotive industry is Thermal Rotate Check (TRC) – a thermography-based test bench solution for contactless and non-destructive testing of rapidly rotating components such as brakes and tires. This system enables to scan brake discs under high-speed up to 105 kilohertz. InfraTec delivers and integrates TRC in existing brake test benches worldwide.

In this application the high-end camera series ImagerIR® is used, which is both developed and produced in-house by InfraTec. This thermographic camera series suits the needs of users from industry and science. Its cooled photon detectors permit images with up to (1,920 × 1,536) IR pixels. InfraTec's range of products includes the high quality VarioCAM® HD thermography systems, which are the result of close, long-standing cooperation between InfraTec and the premium manufacturer Jenoptik. This scope of performance is perfected by expert consultancy in the choice of equipment and by providing staff training when introducing thermal imaging technology.

InfraTec was founded in 1991 and, with its own capacities in manufacturing and development, employs about 200 staff now. For more than 25 years, the company has been supplying thermal imaging technology to demanding customers in the value chain of the automotive development and manufacturing. World market leaders such as Audi, BMW, Daimler and Volkswagen have been cooperating with InfraTec for many years when it comes to temperature data. These companies use thermal imaging systems for tasks in process control, quality assurance and in the field of research and development.

Booth: 40

INTES GmbH

Germany
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INTES is your competent partner for all aspects of numerical simulation using Finite Elements (FE). INTES develops and markets the standard software PERMAS to perform FE analysis tasks.

PERMAS enables the engineer to perform comprehensive analyses and simulations in many fields of applications like stiffness and stress analysis, contact analysis, vibrations, acoustic simulations, heat transfer, different kinds of optimization including topology, shape and sizing, as well as rotordynamics and reliability analysis. Brake squeal is widely understood as friction induced dynamic instability. PERMAS provides the fastest and most realistic squeal analysis tool by including various physical effects such as the real contact area, gyroscopic and additional stiffness terms. The gyroscopic and stiffness terms are taken into account, which consider the disk as elastic structure in an inertial reference system. Additional stiffness and damping terms are derived from the frictional contact state previously calculated in the contact analysis. In addition, advanced methods, like optimization and sampling, are available as core features of PERMAS for numerical simulation of brakes. VisPER serves as a complement to PERMAS. It delivers comprehensive functionality for model set up, including a tailored solution for brake squeal analysis (Brake Squeal Wizard). The analysis process is completed by exhaustive post processing functionality.

Booth: 29

Itaprochim SRL

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Itaprochim, leader in the Friction Industries, develops and produces raw materials based on its own technology. Itaprochim has always been focused on the research and development of new materials and technologies.

Our goal is to provide customers with a range of raw materials and auxiliary goods from reliable and qualified sources.

Booth: 79
Gold Sponsor - Lanyards

ITT Fine Blanking

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ITT Fine Blanking is a back-plate supplier for brake pads destined to passenger cars, vans and truck applications. There are around 1.500 different references of back plates produced and distributed to the main European, American and Asiatic car manufacture brands. ITT Fine Blanking operates in a proactive and serious way to provide solutions that address and exceed customers' expectations for safety, performance and comfort. ITT Fine Blanking is the only Fine Blanking Company that uses in its production standard hydraulic presses (10 lines) and the process PDT (Process Double Table) - a unique line starting from steel coil up to final packaging without any intermediate handling from operators. ITT Fine Blanking today is producing back plates with two PDT lines, one with total tonnage 1.760 Tons and one with total tonnage 2.400 Tons. These lines are powerful and flexible thus adequate to the challenging Global platforms. Moreover, they are ideal for complex backing plate manufacturing like the reinforced back plate used for production of brake pads on Continental FNT calipers. Premium flatness for high performance brake pads and CRS system are also the first-class advantages that distinguish ITT Fine Blanking production. High quality standards are granted by ISO/TS 16949 certification.

Booth: 44

ITT Friction Technologies

Italy
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Email: keiko.claassen@itt.com
Website: www.ittftrich.com



ITT is a diversified leading manufacturer of highly engineered critical components and customized technology solutions for growing global sectors in energy, transportation and industrial markets. ITT's Friction Technologies develops, produces, and sells brake pads and friction materials for private and public transportation markets and major automotive manufacturing industries around the world. They are a leading supplier of technological innovations in automotive R&D services and are recognized by the market for quality, expertise and reliability.

Booth: 49
Gold Sponsor - Proceedings

Exhibitor Directory

James Durrans & Sons

United Kingdom
Telephone: +44 (0) 1226 370 200
Email: sbostwick@durrans.co.uk
Website: www.durransgroup.com



The James Durrans Group is a family owned group of companies established in 1863 with the head office at Penistone, Sheffield in England and three other UK manufacturing sites at, Bilston (West Midlands), Brancepeth (Co. Durham) and Scunthorpe, (Lincolnshire). The group markets a complete range of Carbon-based materials supplying to a wide range of industries globally.

James Durrans Friction Division offers a full range of carbon-based materials to the friction industry. Supplying to Original Equipment, Original Equipment Spares and Aftermarket. With operations and sales offices at Willich (Germany), Tianjin (China) plus Joint Ventures in India, South Africa and France. We also have agents / distributors specialising in the friction industry throughout the world offering our materials. All providing a technical and sales service.

We offer a full range of Natural Graphite, Synthetic Graphite, Petroleum Coke, Metallurgical Coke and Blended Carbons. We can also offer purpose made materials to customer's specifications.

Please contact Mr Steven Sherry Sales Manager at ssherry@durrans.co.uk to discuss your requirements.

Booth: 60

Kärntner Montanindustrie GmbH

Austria
Telephone: +43 435 254 535
Email: g.kert@kmi.at
Website: www.kmi.at



KMI is leading global supplier of lamellar MIOX and producer of Wollastonite, Mica Muscovite, Mica Phlogopite and Talc. These functional minerals are used in various industries such as friction materials and brake pads, polymers, coatings and ceramics. As a specialist in micronization of mineral raw materials KMI produces high quality functional fillers in a particle size range of 1µm - 1mm and is focused on high aspect ratios. The products of KMI contribute to the wide range of raw materials for brake pads. MIOX is a mild abrasive, has a lamellar structure and provides a high aspect ratio. With its combination of properties, it is able to substitute Zirconium Silicate or Potassium Titanate with similar or even better technical performance. MIOX offers lower raw material costs, increase of thermal transmission, reduced thermal expansion and furthermore. Mica and Wollastonite are well-known fillers for brake pads and are provided at highest quality standards.

Booth: 23

Kommerling UK

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Website: www.kommerlinguk.com



Kommerling UK (an H B Fuller Company) have been supplying bonding agents to the Friction Industry for over 15 years. All the products, produced in the UK, are water based to meet the environmental requirements of our customers and designed to pass the demanding Automotive test specifications for Hot and Cold Shear, with application by either roller or spray. A complete range of products for other elastomer to substrate requirements is also available see www.kommerlinguk.com

Booth: 34

Lapinus

Netherlands
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Email: mike.palmen@lapinus.com
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At Lapinus, we offer premium quality stone fibres and strong technical support for the friction industry. We go beyond being raw material supplier by researching the functionalities of our products together with other materials in the friction matrix. Rise to global challenges for friction, our team has continuously driven innovation for better solutions together with our customers. Rooted in sustainability, our highly biosoluble products contribute to shaping a better world for today and tomorrow.

Lapinus is part of the ROCKWOOL Group.

Booth: 32

LF GmbH & Co. KG

Germany
Telephone: 021431383030
Email: info@liqfric.com
Website: www.liqfric.com



The company was founded in 2016 and is based in Leverkusen, Germany. The company develops, manufactures and sells liquid friction compounds to manufacture brake- and clutch-friction materials. The uniqueness of these products lies in the ease of application and pressure-less form giving. The company was awarded Second Place in Best Poster Competition at EB 2018 for 3D Printed Friction Material.

Booth: 30

Link Engineering Company

Germany
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Website: www.linkeng.com



Established in 1935, Link Engineering Company is the global leader in designing and manufacturing a complete range of test systems and in providing test services to the transportation industry in the areas of brake, transmission, driveline, steering, wheel, hub, tire, bearing, and electric motor applications. Headquartered in Plymouth, Michigan (suburb of Detroit), LINK operates facilities providing test services, test system sales, and customer support across the United States, Brazil, China, Japan, Germany, Korea, and India. LINK allows its global customers to realize their optimal test solutions through its in-depth industry knowledge, comprehensive test services and support, and state-of-the-art test systems.

Booth: 74 & 76

Gold Sponsor - Stationery

Linyi Hongtu Electron Co. Ltd

China
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Email: leo@lyhongtu.com.cn
Website: www.lyhongtu.com.cn



LINYI HONGTU ELECTRON CO., LTD is a leading manufacturer of brake pad wear sensor and a reliable supplier of ABS sensor and brake pad accessories in China.

"HONGTU" has become a top brand of brake pad wear sensor in China and European countries. Thanks to our excellent reputation, our quality standards and our highly competitive prices, we export successfully to more than 40 countries. Over 40% are with final destination O.E. or O.E.S. We produce more than 1000 references for both passenger cars and commercial vehicles. Our quality system is certified according to IATF16949. Each product is extensively tested to ensure you are receiving a high-quality and reliable product. Till now, HONGTU has set up an office in Germany and a warehouse in Turkey.

We are aiming to be a world leader in providing top quality brake pad wear sensor and wish to build long-term business relationship with you.

Booth: 7

Lödige Process Technology

Germany
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Lödige is a global leading supplier of mixers, coating systems, granulators, dryers and reactors. As the inventor of the Ploughshare Mixers, Lödige has decades of experience in the process technology. Machines and process systems are at home in the pharmaceutical and food industry just as well as in the building materials industry, environment, minerals and ores but also chemicals and plastics. Lödige is specialised in the industrial mixing, drying, reacting, coating and granulating. Lödige deals with bulk products, granulates, powders, pastes, dust and sludge. The specific requirements of the different branches of industry are very well known, as the mixing of building materials or the drying of recycling materials. Batch or continuous mixers, ringlayer mixers for high throughputs, mixing reactors for operation under high pressures, laboratory mixers, mixing granulators, vacuum dryers or fluid bed systems... Lödige has the solution. Technical know-how and support are a matter of course for Lödige. All process steps like mixing, drying, reacting, coating and granulating can be performed in the test centre. Lödige provides customer support worldwide during the whole lifetime of the machines. An experienced team in Paderborn/Germany and the colleagues in the USA, Spain, India and China make it possible to perform maintenance works rapidly. Lödige has supplied more than 30,000 machines all over the world in the last 80 years. Lödige is still a family-owned company in the third generation. Around 270 people are working on the site in Paderborn/Germany. The total turnover amounts to approx. 60 million euros.

Booth: 16

Logel Makine Otomotiv Sanayi Ve Ticaret A.S.

Turkey
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Email: export@logel.com.tr
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Founded in 1983, our company has succeeded in becoming a customer-focused organization strengthening its infrastructure through Kaizen activities, strategic targets and plans and the most successful examples of the machinery sector ever since its foundation. It continues its operations based on this principle. It has reached significant achievements between the past and the future. The company is involved in new projects and presents the market its disc brake pads for heavy vehicles, light commercial vehicles, passenger cars and racing cars through its specialized staff in accordance with its Research & Development activities. It created PWR brand by developing new, environment-friendly formulas based on its Research & Development activities initiated in 2006. PWR continues to operate in this sector by proving its success with its production activities that meet the quality standards and requirements of the global market. Also, our company manufactures and sells its product under FEDOR, OZZO, LGL, LEKSO and MINAGOOR brands.

Booth: 46

Exhibitor Directory

Lumag Sp. z o.o.

Poland
Telephone: +48672844822
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Website: www.lumag.pl



LUMAG was founded in 1988 by Marek Zak, the current main shareholder and CEO. Initially we focused on the production of brake linings. Later we implemented our own brake pad manufacturing technology. Over the years the company achieved enormous technological progress, which is showcased by or constantly upgraded collection of machinery, applied engineering solutions as well as the continuous rise of quality and safety standards. Apart from the friction materials production, Lumag company produces accessories for brake pads which includes: anti-noise shims, and piston clips. These products are entirely produced on fully automated (progressive dies) high-end stamping line by swiss Bruderer. Since 2018, Lumag became a serious supplier of fineblanked metal components to the braking industry. Our range now includes backplates for commercial vehicle brake pads. The investment of nearly 10 Million Euro's made Lumag a serious supplier to the European OEM'S which require fineblanking backplates for their brake pads. Not only will Lumag continue its investment policy in further development of current products portfolio (backplates) but also will develop other metal components to the automotive industry.

Booth: 53
Gold Plus Sponsor

MaGyc S.r.l.

Italy
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Founded in 2001, Magyc is specialized in design and manufacturing of High Precision Testing and Measurement Systems for Industrial Quality Control. Magyc today counts on over 15 years of experience in product and process innovation, quality control, assurance systems, problem analysis and customized solutions. Thanks to its know-how and the collaboration with the most innovative industries and research institutes, MaGyc is today a leader of the quality control in industrial sector, through its specialization in Industrial Problem Solving by use of NDT technologies.

MaGyc is specialized in data acquisition and analysis by different techniques, also non-conventional ones as neural networks, fuzzy logic, TRIZ. Some of Magyc competences are:

- FRF Technology, successfully used to detect cracks, porosity, incorrect heat treatment, machining errors through "frequency responses" comparison and 0,5 sec tests. Application examples: disks, drums, pads, sintered materials, ceramics and castings.
- Ultrasound Analysis, used for the detection of cracks, porosities or void that may be present within any artefact's, for thickness measurements even inside milling operations, for the detection of flaw or the characterization of material. Application examples: aerospace and railway industry, electrical contacts, control of weldings and joints obtained by Friction Stir Welding (FSW).
- Image processing, used to analyse surface and dimensions by real-time images analysis with integrating robots and proprietary software operating on industrial PC. Application examples: ceramics, automotive components like pistons, lead batteries, food are just some of the sectors of application of image processing. Challenges always exist in production: Magyc finds the unique solution with the specific approach.

Booth: 37

MANN+HUMMEL GmbH

Germany
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Website: www.mann-hummel.com/en



About MANN+HUMMEL MANN+HUMMEL is a leading global expert for filtration solutions. The company group with its headquarters in Ludwigsburg, Germany, develops

solutions for motor cars, industrial applications, clean air in interior spaces and the sustainable use of water. In 2017 the group achieved sales of approx. 3.9 billion euros worldwide with more than 20,000 employees at more than 80 locations. The products manufactured by the group include air cleaner systems, intake manifold systems, liquid filter systems, plastic components, filter media, cabin filters, industrial filters and membrane filters. Further information about MANN+HUMMEL is available at <http://www.mann-hummel.com>

Booth: 68

MENETA Group

Denmark
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Email: sales@meneta.dk
Website: www.meneta.com



A TRUSTED PARTNER

Our pursuit of the highest industry standards also applies to delivery and quality management.

We are IATF 16949:2016 certified – the automotive industries most widely used standard. This certification ensures adherence to stringent customer-specific requirements, and continuous focus on risk reduction and manufacturing efficiency through industry best practices.

FOR OVER 65 YEARS, MENETA HAS DELIVERED TECHNOLOGY

Our innovation is the result of world-class materials know-how, unique testing capabilities, and quality assurance that meet the industry's highest standards.

TRUST

As part of the automotive industry's global supply chain, we understand the importance of stability and timing. We are dedicated to being a reliable partner – today, and in the future.

TRADITION

We are proud of our traditions for collaboration, craftsmanship, and engineering excellence.

From our beginnings in 1953 as a local toolmaker and punching workshop, we've grown to become a global supplier of high-quality braking components for the automotive industry. Today, we are over 2,000 employees in Europe, Asia, and North America. We design, test and produce millions of brake shims, back plates, and brake components each year.

Booth: 43
ESOP Sponsor

Microface Ltd

United Kingdom
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Email: sales@microface.com
Website: www.microface.com



Microface specialises in the automation and upgrading of all Link, Greening, Schenck and Jurid Test Equipment, and the same type of machines from other manufacturers.

We are generally regarded by our customers as the best in the world, having the fastest Constant Torque Controller on the market and the best solution for Graphics CAD, saving what can be man-weeks of work on new graph layouts and making changes to existing layouts whilst providing easy auditing of mistakes.

The Testing automated by Microface is unsurpassed in its accuracy and repeatability of results.

Booth: 18

Mineralmühle Leun Rau GmbH

Germany
Telephone: +49 644 294 410
Email: info@mineralmuehle.com
Website: www.mineralmuehle.com



MLR - special and standard raw materials.

Mineralmühle Leun has more than 30 years of experience as a leading supplier of high quality industrial raw materials to the global friction industry. We serve as the holding and distribution company for our international production companies with a vast range of industrial and special products.

Our worldwide customers recognize MLR as an outstanding strategic partner.

Supported by our technology and combined with our global network MLR provides excellent products and exceptional service. Our general product portfolio exceeds 1000 materials in the field of minerals, metal powders, alloys and chemicals.

Titanates:

Manufactured by our daughter company IMMI-Titan we provide several types of Potassium Titanates in various sizes, shapes and chemistry. Our REACH registered products find their application in many formulations around the globe.

Based on our experience in the friction industry we strive to develop new materials and to offer solutions to the changing requirements of the automotive industry.

Industrial Minerals and Chemicals:

Manufactured and/or traded by Mineralmuehle Leun, we offer a broad range of friction raw materials: Zircon silicate (sand and flour), various Alumina grades, Fused Silica, Feldspar, China Clay, Graphite, Metal oxides.

Metal and alloy powders:

Alusil GmbH is the sales organisation for our manufacturing company Kovohuty Dolny Kubin. Together we offer milled and atomised powders of copper, bronze, tin, Fe-alloys, Non-Fe alloys and stainless steel. PMCTec GmbH provides mixed metal powders and special alloys to the automotive industry.

MLR continuously and reliably provides high quality products and services to our customers.

Booth: 21

Morgan Advanced Materials

United States
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Email: Wendy.Evans@morganplc.com
Website: www.morganthermalceramics.com



At Morgan, we engineer, manufacture and supply technologically advanced fibre and microporous materials to help the automotive industry solve complex thermal runaway and fire protection challenges in electric vehicles.

Booth: 56

NOF Metal Coatings Europe S.A.

France
Telephone: +33 344 646 362
Email: info@nofmetalcoatings.com
Website: www.nofmetalcoatings.com



NOF METAL COATINGS Group is the pioneer in zinc flake coatings for metal corrosion protection and develops waterborne chemicals contributing to reduce impacts on the environment, health and security of people.

NOF METAL COATINGS Group aims at sustainable developments by decreasing impressively V.O.C. and CO2 emissions, complying with environmental directives and withdrawing products harmful to health.

An intensive industrial and research footprint in Asia, Europe and America allows us to work continuously on improving our chemicals and application technologies.

GEOMET® 360, label coating trademark, in collaboration with a strong network of job coaters and captive users, has become the reference for brake rotors and has been specified by many car manufacturers worldwide such as AUDI, BMW (MINI), HONDA, HYUNDAI, KIA, PEUGEOT-CITROEN, RENAULT, SEAT, SKODA, VOLKSWAGEN.

GEOPERF®, outstanding properties, is a new challenge. How to boost performance? How to build a new standard? How innovating coatings can target new steps? @Come and visit us!

Booth: 50
Gold Sponsor - Conference App

Exhibitor Directory

NUCAP Industries Inc.

Canada
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Email: info@nuicap.com
Website: www.nrsbrakes.com



NRS™ is NUCAP Industries' patented process for the surface modification of disc brake backing plates, adding a consistent matrix of raised steel hooks that facilitate a mechanical bond between disc brake plate and friction materials. The NRS™ hooks provide mechanical bonding while exceeding industry requirements for heat, shear and environmental delamination protection.

NRS™ is often called "the hidden benefit", essentially invisible on a finished brake pad while delivering brake products that:

- Are Safer, Quieter and Longer Lasting
- Will not fail under extreme loads or corrosion
- Improves the Friction Bonding Process, in the plant and in-use
- Have been used inside close to 1 Billion Brake Pads since launch

Originally used in racing, truck and fleet applications where brake integrity is critical to vehicle safety, NRS now available within North America's leading brake pad brands.

Booth: 55 & 58
Platinum Sponsor

Otsuka Chemical Co

Japan
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Email: Ogawa.Hiroshi.a@otsuka.jp
Website: www.otsukac.co.jp



Otsuka Chemical manufactures various types of Titanate (TISMO, TERRACESS) and its plastic compounds (POTICON).

The benefits of TERRACESS are as follows:

- 1) Stabilization of the effectiveness
- 2) Improvement of the NVH performance
- 3) Low wear both rotor and pad

TERRACESS itself, brake pad and rotor after test and typical data will be exhibited.

Booth: 13

PALLMANN Maschinenfabrik GmbH & Co. KG

Germany
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Website: www.pallmann.eu



PALLMANN specializes in size reduction and offers the widest range of machines and complete Systems for successful preparation of all soft to medium hard, brittle, tough, elastic or fibrous materials. As pioneers in the field of size reduction, we have made an important contribution to today's State of the Art of size reduction and material preparation techniques resulting in numerous patents. The technical Solutions of PALLMANN contribute to an optimized utilization of existing resources and to increase productivity.

Booth: 38

Palmer International

United States
Telephone: +1 610 584 4241
Email: info@palmerint.com
Website: www.palmerint.com



Palmer International has been developing and manufacturing innovative products based on Cashew Nutshell Liquid (CNSL) for the global automotive friction material industry for over fifty years. Our liquid and solid particle CNSL products are found in formulations from motorcycles to trains and everything in between. Please stop by our booth to learn about our new manufacturing plant in India.

Palmer...Innovation in a Nutshell!

Booth: 72

Polytec GmbH

Germany
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Polytec develops and manufactures high-quality measurement systems for the non-contact analysis of vibration, length, speed and surface topography to solve our customers' application challenges in research, development and manufacturing quality and process control.

Polytec 3D Scanning Vibrometers represent the gold standard for experimental and operation modal analysis in brake acoustics. Model updating on component and assembly level worldwide relays on the high-fidelity test data generated by unique laser vibration sensor system. Using this technology, researchers have managed to track down and control the causes of undesired noises when braking.

Booth: 39

Procotex Corporation sa / Apply Carbon sa

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Email: info@procotex.com
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Procotex Corporation S.A. based in Dottignies, (BE), with factories in Lithuania, Turkey, Belgium and France. We are specialized in flax hacking, synthetic, natural & technical fibers recycling. Via its subsidiary Apply Carbon sa in France, Procotex offers an entire range of carbon & aramid fibers in milled, chopped, granulated, sized or un-sized form. In March 2018 Procotex Corporation sa acquired the assets of the company Herzog AG in Switzerland who had decades of experience in supplying milled para-aramid fibers to the friction and gaskets industry. Production of milled aramid fibers has been relocated in 2018 from Switzerland to our plant Apply Carbon sa in France. Procotex Corporation sa and Apply Carbon sa are ISO 9001 certified companies and maintain the highest level of quality control and traceability. Thanks to our large-scale operations, extensive stocks and optimized production systems we can serve high volume contracts in aramids or other fibers.

Booth: 95

Produco GmbH

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To Follow

Booth: 70

Qingdao Braide Graphite

China
Telephone: +86 532 888 932 96
Email: sales@br-graphite.com
Website: www.br-graphite.com



Producer of natural flake graphite, expandable graphite, spherical graphite, synthetic graphite for over 15 years.

Booth: 8

QUARTZ S.R.L. SU

Italy
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Email: quartz@quartzchem.com
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Quartz S.r.l.s.u. is an Italian Company established in 1997 with Headquarter in Milan and production plants located nearby Milan (Italy) and in Bangkok (Thailand). The Company has Certifications for ISO 9001:2015, ISO 14001:2015 and OHSAS 18001:2007. Production is mainly focused on Metal Sulfides i.e. Antimony Trisulfide, Zinc Sulfide, Tin Sulfides, Mixes of various ingredients, and recently, Titanates manufacturing. A R&D Team with experts in Friction and professional PhD scientists (both Chemistry and Engineering) are constantly developing new environmentally friendly products in cooperation with the most important Italian Universities and specialized independent Laboratories.

Booth: 28

Raicam Industrie

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RAICAM develops and manufactures high quality brake pads for passenger cars and commercial vehicles. It is a reliable partner for the major car manufacturing industries, guaranteeing secure and comfortable breaks with its wide range of material formulations. Recently it has also developed LOW STEEL and NAO materials copper free, in accordance with the 'Better Brakes Regulation' (Chapter 173.901 WAC, 19/10/2012) and 'California's Brake Friction Material Law' (Senate Bill n. 346, Chapter 307, 25/09/2010). An expert team of R&D engineers' materials customer-tailored and positively assessed by the global market.

Booth: 80

Reichmann & Sohn GmbH

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Email: slojewski@reichmann.com
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The Reichmann & Sohn GmbH is a German engineering company with 100 years of experience in cutting and grinding. The division Reichmann Casting Finishing is the world's leading supplier of machines for casting finishing and fettling technologies. A particular focus lays on automatic grinding systems for round parts such as brake discs and brake drums. Apart from that, Reichmann offers customer-tailored and innovative solutions for abrasive cutting and belt grinding. To ensure a further automatization in foundries, the machines can be equipped with suitable robot solutions.

The name Reichmann is known for robust machine constructions "Made in Germany", a long machine lifetime and reliable high availability. Foundries invest with a Reichmann machine in consistently high quality, economic processes and ergonomic working conditions.

Booth: 9

RENK Test System GmbH

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Website: www.renk-ag.com



RENK offers over 30 years' experience of manufacturing high-quality test systems for drive-train components, brake-systems and complete vehicles. Due to decades of experience in in-house R&D test equipment, today RENK is one of the leading manufacturers of customized test systems for the automotive, wind power, agricultural, aviation and railway industries. Worldwide, renowned OEMs take advantage of our extensive experience in drive technology, measuring technology, electronics and system design and rely on RENK test systems for R&D as well as for quality assurance after production and overhaul.

Booth: 6

Exhibitor Directory

Richard-Anton KG

Germany

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Richard Anton KG is one of the world's leading suppliers of synthetic Graphite and calcined Petroleum Coke for brake linings. Our products can be found in nearly all types of vehicles. Founded in 1904 in Munich, the German company is still a 100% family-owned business which is now already managed by the 4th generation. In our two plants in Germany we produce customised carbon products for nearly all major brake lining manufacturers worldwide. Since nearly 40 years Richard Anton KG has been specialising in producing first-class synthetic graphite and calcined petroleum coke for friction applications under the brand name RANCO. The selection of suitable raw materials of consistently high quality, state-of-the-art production facilities in combination with our know-how and production experience of decades, enable us to supply carbon products for brake linings for all kinds of vehicles - of course following quality and environmental certifications according to ISO standards.

Booth: 63

Rimsa Metal Technology SA

Spain

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Email: sales@rimsa.com
Website: www.rimsa.com



Since 1985, we are leading manufacturers of non-ferrous materials, which are sold to more than 35 countries scattered across 5 continents. At rimsa, we have been continuously developing innovative products which meet the highest standards and trends of the Global Friction Industry. Through an intense R&D program, we have developed a state-of-the-art technology to produce a wide range of synthetic metal sulfides, which can adapt to the specific requirements of our clients. We use our knowledge and expertise to provide efficient and flexible solutions to the prevailing challenges of our partners. In this way, our new products enhance the performance of brake pads at high temperature and are suitable for copper-free formulations. Please visit our booth # 24 to learn more about our Company and Products.

Booth: 24

RTE Akustik + Pruftechnik GmbH

Germany

Telephone:
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Profile to follow

Booth: 94

Rtec-Instruments, Inc

United States

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Rtec-Instruments develops and manufactures advanced imaging and surface mechanical property measurement solutions for research and industrial applications. Based out of Silicon Valley, we are a leading provider of test instrumentation such as tribometer, optical profilometer, scratch tester, micro hardness tester etc.

We share a philosophy that embraces collaboration and partnering with customers and other leaders in academia and industry to ensure that our products answer real needs with innovative solutions. Our San Jose, California headquarter houses all research, development, manufacturing and factory support operations.

Booth: 41

Sadeca Automotive, S.L.U.

Spain

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Sadeca is located in Barcelona and was founded on 1983. After these years of rigor, automotive passion and competitive spirit we have become a leader in cable manufacturing for the automotive industry. We are specialized in the development, design and production of brake wear sensors, brake system hardware and several industrial wire harness applications for passenger cars, commercial vehicle and trucks for OEM/OES and AM segments. Thanks to our quality standards, guaranteeing the compliance and strict supervision of the control and validation procedures required in the automotive industry, we have become a global supplier of the major brake pads and brake systems producers. We have the most complete range of products in the industry, an extensive global sales network and manufacturing plants in 3 continents (Barcelona, Guangzhou & Tanger Free Zone) allowing us to follow our customers in their international expansion projects, providing our products with ease and proximity worldwide.

Booth: 36
Key Card Sponsor

Saint-Gobain

Germany

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Since 1997, Biolink has been designing, developing and producing a wide range of specialist self-adhesive products, using our unique UV-cured technology and customer-focused philosophy. For manufacturers around the world that need reliable and innovative solutions to their fixing, mounting and bonding applications, Biolink provides high-performance, solvent-free, environmentally-friendly PSA solutions, designed and delivered with expertise and creativity.

Booth: 67

Schwarzwalder Textil-Werke Heinrich Kautzmann GmbH

Germany

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Website: www.stw-faser.de



Schwarzwalder Textil-Werke Heinrich Kautzmann GmbH develops and produces high-quality fibres for different industries and applications. As leading specialists in fibre fillers, short cut fibres, fibrils & pulp, as well as customised solutions, we process all fibre materials; from natural fibres to synthetic fibres through to high-tech fibres. Thanks to decades of experience, continuous research and strong customer-orientation, we are able to react flexibly to new requirements with our bespoke fibre solutions. And since we are active in over 70 countries, you will always find a competent fibre expert in your vicinity.

Booth: 10

Showa Denko Carbon, Inc.

United States

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Email: sdkcgranular@sdck.com
Website: www.sdk.co.jp/english/



Showa Denko Carbon, Inc. is a member of the Carbon Division of Showa Denko K. K., a global company using aluminum, inorganic and organic chemical technologies to provide industrial and consumer products for energy, automotive, information/telecommunication, and environmental applications. The Carbon Division manufactures graphite electrodes for electric steelmaking and graphite particles for vehicle (friction) and industrial applications.

In 2017, the Carbon division acquired SGL Carbon GE, making Showa Denko Carbon, Inc. the world's largest producer of graphite electrodes. This includes production facilities in the U.S., Japan, Germany, Spain, Austria, Malaysia and China with a combined capacity of 250,000 MT/y.

Showa Denko Carbon, Inc. in the U.S. (South Carolina) is the only manufacturing facility in the Carbon division that specializes in the production of artificial graphite particles for high performance friction materials used in OE, OES and aftermarket vehicle applications. The use of high-quality raw materials, high temperature production processes, and a certified quality system results in Showa Denko Carbon providing artificial graphite particles with consistent and reliable material properties to our customers each and every time.

Booth: 89

SHW Automotive GmbH

Germany

Telephone: +49 7361 502 1
Email: info@shw.de
Website: www.shw.de



The Company was established in 1365, making it one of the oldest industrial companies in Germany. Today, SHW AG is a leading automotive supplier, providing products that make a substantial contribution to reducing fuel consumption and, consequently, to lowering CO2 emissions. In its Pumps and Engine Components business segment, the SHW Group develops and produces pumps for passenger cars (including circuit boards) and Truck & Off-Highway applications (e.g., trucks, agricultural and construction machinery, stationary engines and wind farms) as well as engine components. The Brake Discs business segment develops and produces monobloc ventilated brake discs made of cast iron and lightweight composite brake discs made of a combination of an iron friction ring and an aluminium pot. The SHW Group's customers include renowned automobile manufacturers, manufacturers of commercial, agricultural and construction vehicles as well as other suppliers to the automotive industry. Currently, the SHW Group has five production sites in Germany located in Bad Schussenried, Aalen-Wasseralfingen, Hermsdorf, Tuttingen-Ludwigstal and Neuhausen ob Eck, sites in Brazil (São Paulo) and China (Kunshan) and a sales and development centre in Toronto (Canada). With about 1.350 employees on average, the Company achieved Group sales of slightly above € 400 million in the fiscal year 2017. Further information is available at HYPERLINK "http://www.shw.de" www.shw.de

Booth: 77

Speciality Lubricants Corporation

United States

Telephone: +1 800 385 823
Email: ken@speclubes.com
Website: www.speclubes.com



Manufacturer and private label packager of Brake Lubricants that are proven to reduce NVH. Other products include brake assembly fluid and rotor cleaning solution. Private label packaging available in pouches, squeeze tubes, wipes and bulk containers.

Booth: 57

STAC Elektronische Systeme GmbH

Germany

Telephone: +49 215 193 7270
Email: info@stac.de
Website: www.stac.de



STAC manufactures fast and precise NVH test systems, which are frequently used in automotive industry. STAC is featuring EVENTSCAN, a system for detecting and analyzing brake noise events. EVENTSCAN enables laboratory-based dynamometer tests as well as in-vehicle-tests on the road. The system acquires sound and vibration signals; other parameters like pressure, temperature, speed, etc. may be acquired via analogue inputs, CAN bus, GPS sensors, tachometer pulse inputs and others. All acquisition and analyzing tasks are performed on-line and in real-time. EVENTSCAN is used by US, European, and Asian car manufacturers, brake system suppliers, and friction and damping material manufacturers worldwide.

Booth: 2

Superior Graphite

Sweden

Telephone: +46 601 341 88

Email: CustomerServiceEU@superiorgraphite.com

Website: <https://superiorgraphite.com/>



Delivering unparalleled quality since 1917, Superior Graphite provides unique solutions for the friction market among others. FormulaFX™ materials utilize a variety of carbonaceous materials, from synthetic to crystalline flake graphite to calcined petroleum cokes, to offer a full spectrum of friction modifier materials, each with specialized performance and durability characteristics designed to meet specific industry requirements in every category. Resilient Graphitic Carbon™ (RGC™) materials are one of the most specialized graphitic carbons available today. These materials are produced utilizing our patented high-temperature purification technology using premium raw materials offering specific morphology, high porosity, and resiliency. Applied in low concentrations as a friction modifier for brake pad applications, it greatly improves performance parameters such as compressibility control and wear-noise reduction. Superior Graphite provides continuous electro-thermal treatment/purification of graphite & carbons, advanced sizing, and custom-mix technologies for energy/thermal management, metallurgy (iron & steel), friction modification, drilling material additives, non-oxide ceramics, and polymers/CASE materials. Headquartered in Chicago, Illinois, USA, with locations in Germany, Sweden and China, Superior Graphite offers technologies and a consultative approach that give engineers access to purpose-manufactured materials, with unparalleled consistency that delivers confidence. In addition, our precision grinding and sizing technologies translate into an unmatched ability to alter and customize product attributes to suit specific requirements, making commercialization more efficient and reliable.

Booth: 26

TecSA S.r.l.

Italy

Telephone: +39 011 980 4001

Email: info@teca-srl.it

Website: [www.teca-srl.it/index\(en\).html](http://www.teca-srl.it/index(en).html)



We are manufacturer of Brake Inertia Dynamometers and test machines, we also do the Upgrade (electrical, electronical, mechanical and system acquisition) of old test benches inasmuch as we have developed our own software. Our line of products includes test machines for quality control (Friction Quality Test machine, Shear Strength Test machine, Mini-Dyno) and dynamometers of various sizes (both for brakes and clutches) and other machines for automotive, truck, railway and planes tests. We have also a strong experience in the development and realisation of the test dynos for Formula 1 sector. In our Laboratory we can perform the following test: Ak Master - AMS; Performance; Fade; Wear; Thermal shock; Thermal fatigue; Static friction; Creep Groan; Hill Hold.

Booth: 69

Teijin Aramid GmbH

Germany

Telephone: +49 202 322 317

Email: friction@tejinaramid.com

Website: www.tejinaramid.com



Teijin Aramid is a subsidiary of the Teijin Group and world leader in aramids. Its aramid products Twaron®, Teijinconex®, Technora® and its ultra-high molecular weight polyethylene (UHMW-PE) Endumax® are renowned for their strength, sustainability, safety, heat resistance and low weight and are used in different applications and markets including automotive, ballistic protection, marine, civil engineering,

protective clothing, ropes, fibre optic cables and oil & gas. These high-performance materials are produced in the Netherlands, Thailand and Japan. For more information: www.tejinaramid.com

Booth: 51

Trelleborg Sealing Solutions Kalmar

Sweden

Telephone: +46 480 499 400

Email: Kai.Koppers@Trelleborg.com

Website: www.rubore.com

Trelleborg Sealing Solutions Kalmar is the world leader in the production and development of brake noise and vibration damping solutions for automotive and industrial applications.

Our main products are shims, but considerable achievements have been reached in sound damping of engine and chassis' parts for the automotive OEM and industrial markets. We are the world leader in the innovation of new rubber to metal sandwich-composite materials and very successful in the world market with noise insulation materials.

This strength is the result of an ambitious, forward thinking Company Policy based on competence and quality, supported by a highly skilled Research and Development department. We provide a high level of customer service to support products manufactured by a unique process which is patent protected world-wide and are ISO/TS 16949, ISO 9001 and ISO 14001 certified.

We are part of the Trelleborg Group, which is a global industrial group offering leading-edge expertise in rubber technology.

Booth: 1

WALTER WERNER
METALLVEREDELUNG

FOR A BETTER FINISH.

IATF 16949 | AIAG CQI | EMAS

VISIT US ON

booth 61

Walter Werner GmbH – your metal finishing specialist

We provide for decorative surfaces and protect metals and plastics against corrosion and wear – professionally and flexibly.

Our company provides all these services from a single source:

▪ PRETREATMENT

Blasting, degreasing, pickling, passivating, phosphating

▪ ELECTROPLATING

Anodising, galvanizing, zinc nickel plating (acid and alkaline)

▪ COATING

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▪ BONDING AGENTS

Bonding agents applied by rollers, drums and automated machinery

▪ SERVICES

Testing, sorting, assembling, packaging, delivering

For more information please visit:

www.walter-werner.de

Exhibitor Directory

Tribotecc GmbH

Austria
Email: office@tribotecc.at
Website: www.tribotecc.at



Tribotecc GmbH is the global market and technology leader of high-performance metal sulfide solutions for the friction industry. The tribological properties of metal sulfide systems with regard to chemical structure, polarity, lubricating ability and thermal behavior are essential for the functioning and performance enhancement of friction products and help to extend the lifetime of components motion. Sulfides of various metals have proven to be the most versatile and most effective additives for stabilizing the coefficient of friction at high level, prevent brake fading, reduce pad and disc wear and increase comfort by less noise and vibrations. A new generation of antimony free, environmentally friendly synthetic materials from Tribotecc is suitable for use as copper replacement in brake pads. With our slogan more than performance we guarantee: - the best quality under the toughest stresses - innovative products - fulfillment of all safety and environmental standards - customer satisfaction. Please visit us at booth no 14!

Booth: 14

TSI GmbH

Germany
Telephone: +49 241 523 030
Email: tsi.emea@tsi.com
Website: www.tsi.com



As the international leader in aerosol instrumentation for over 50 years, TSI Incorporated designs and manufactures precision instruments which are recognized in research and industry worldwide to perform advanced and reliable particle measurements such as brake wear emissions.

Stop by our booth to discuss about your research and measurements. TSI has unique, fast size distribution solutions for conducting brake wear emissions testing: Engine Exhaust Particle Sizer (EEPS) and the 10 Hz Optical Particle Sizer (OPS). This allows you to measure a wide size distribution, 5.6 nm up to 10 µm, in combination with a high time resolution (10 Hz) in flexible configurations.

In addition, TSI offers solutions for your sampling of size-fractionated particles while measuring the particle mass concentration in real-time: The Real-time Quartz Crystal Microbalance (QCM) MOUDI™. This extension of the well-known family of MSP MOUDI™ Impactors provides a full array of measuring solutions for your research.

Stop by TSI's booth #98 to learn how we can help you with your research needs!

Booth: 98

WALDRAFF Technologies GmbH & Co. KG

Telephone: +49 221 949 9530
Email: rick@waldraff.info
Website: www.waldraff.info



Partner of Automotive Industries Planning, design and production of custom-made solutions for the automotive industry and their suppliers.

Machine manufacturing: Shot blasting technology / Coating technology / Materials handling technology / Production lines / Assembly lines / Measurement and test engineering / Automation technology/Handling technology / Manual workstations/Assisting devices / Special machinery Tool manufacturing / Pressing tools (pads for disk brakes) / Specific production tooling sets consisting of: Pressing tool, Magazine (conveying to the press), Feeding tool (loading of the pressing tool), Pick and place equipment.

Booth: 64 & 65

Walter Werner GmbH

Germany
Telephone: +49 678 299 320
Email: info@walter-werner.de
Website: www.walter-werner.de



Walter Werner for a better finish Your certified specialist for metal finishing. Our process portfolio yields decorative surfaces and protects metals and plastics against corrosion and wear. Our business segments are electroplating, coating and bonding agent coatings. Certified under IATF 16949, AIAG and registered with EMAS II, our company applies environmentally friendly production processes for audited product quality each and every time. Walter Werner GmbH has been renowned for its professional surface finishing since 1957 based in Birkenfeld/Nahe (Germany). Whether for mass production or single pieces, we are the one source of all metal and plastic finishing services based on electroplated, chemical, and organic coatings. Operating on 32,000 square metres, over 150 engineers, master electroplaters, electroplating technicians, and skilled workers commit themselves every day to the needs of our customers, most of them in the automotive, machine building, and electrical/electronic industries. Short routes and high flexibility are our strengths. From our location, we can even provide anywhere in Europe custom logistics services that are far from everyday routine. As a medium-sized family run enterprise we attach great importance to personal and partnership-based relations with our business associates. And equal importance to the value of quality and environmental awareness these have been moulding our corporate philosophy since the very outset.

Booth: 61

Winhere Auto - Part Manufacturing Co. Ltd.

China
Telephone: +86 532 857 611 11
Email: Autoparts@winhere.com.cn
Website: www.winhere.com.cn



Founded in 1996, Winhere is the largest professional manufacturer of brake discs and drums in China.

Winhere is TS16949 quality certified by TUV Rheinland, we produce more than 5,000 applications with 44 million unit's annual capacity to service our customers globally.

Winhere has received the world's first ECE R90 certificate issued by KBA in Germany since August 2012, and we are extending full range of our brake discs and drums with R90 certified.

Winhere won gold award of "Best-In-Class" for its high carbon brake disc at the 2015 China international Foundry Expo in April 2015.

On June 11th, 2017, Winhere won the "China Foundry Industry Champion Enterprise (brake disc) award at the 13th China Foundry Association annual conference in Shanghai. At the same time, Winhere re-won the "excellent manufacturing of brake discs and drums" and achieved "AAA Business credit rating" honorary title.

Winhere has established its own R&D centre to design and produce brake disc/drum to meet different requirements from both automotive OE market and aftermarket.

Winhere is your reliable partner you can trust.

Booth: 20

Wolverine Advanced Materials

United States
Telephone: +1 313 749 6100
Email: inquiry.automotive@wamglobal.com
Website: www.wamglobal.com



Wolverine Advanced Materials is a leading developer and manufacturer of high-performance materials. Our core competency is in performance-critical, specialty elastomer-coated metals that offer damping and sealing solutions in the Automotive Brake NVH, and Sealing industries. Extensive industry knowledge and innovative materials have made Wolverine a desired and trusted global supplier for over 80 years.

Booth: 90

Zhengzhou Zhongbang Superhard tools co ltd

China
Telephone: +86 371 860 767 65
Email: nancy.y@zhongbanggongju.com
Website: www.zhongbanggongju.com



Zhengzhou Zhongbang Superhard Tools co.,Ltd established in 1990, locates in the biggest grinding material and grinding tool base - Zhengzhou. We are member unite of CFSMA and CMTBA. We have dedicated to the research& development of the superhard grinding tools for many years. Expand from a small to a large force, from extensive to intensive, we build up perfect manufacture and quality control system. We own many advanced producing and inspecting machines, such as high precision CNC lathe, high precision grinder, CNC milling machine, projector, profile meter, Carl Zeiss CMM, professionally producing grinding tools for brake pad, engine valve, screw compressor rotors, camshaft, casting composite, gear, high precision military industry,robot grinding as well as many other industries. We focus on the research and development of our products, and we have applied for National Invention Patent for the processing technology of the grinding wheel for engine valve and screw rotors. We focus on the excellence of our products and strictly implement the quality standard and responsible for every product to provide our clients high quality products and first-class service.

Booth: 47

Zuhai Glory Friction Material Co., Ltd.

China
Telephone: +86 134 250 858 69
Email: doris.guan@zhglory.com.cn
Website: www.zhglory.com



Glory was founded in 1986, its headquarters' R&D center and main production base located in Zhuhai, China. Glory is professional automobile braking friction materials company. There are nearly 60 engineers work for R&D center today with globally braking field rich experience experts from China, Germany, Japan and US. The main products are automobile using braking pad, braking lining, and brake block for OEM market and Global aftermarket including US, European, Asia, Pacific, etc with 10 Million car sets products annually.

At present, Glory are supporting more than 20 automobile OEM and tire1 such as Great Wall, Changan, Chery, SAIC, General Motor Wuling, ZF TRW, Continental, CTCs, CBI, Bazhou Huacheng, BTL, Shanghai Wanxiang and so on. As one of the largest local friction material suppliers, Glory is the only private enterprise to enter the international Tire1 supply system.

Booth: 97

Zuhai Unimetal Co., Limited

China
Telephone: +86 756 881 7016
Email: sales@u-metal.cn
Website: www.u-metal.cn



Zuhai UniMetal Co. Ltd., engages in metallic wool fibers to friction industries, satisfies their applications of brake pads/lining manufacturing.

*Steel Wool Fiber - 5 Production Lines - Annual Capacity 7000MT *Copper/Brass/Bronze/Aluminum Wool Fiber - 7 Production Lines - Annual Capacity 650MT

Our metallic wool fibers are certified by IATF16949:2016. Selected material, excellent product consistency, good quality and professional service make us your first choice of supplier for OE products or assist brand customers to gain end users' confidence and favor in aftermarket. Factory's strict management in the whole processes, including raw material entry, orders scheduling, production and shipment, brings customers not only a long-term satisfaction of product quality but also good consumption experience by on time delivery.

UniMetal doesn't pursue low cost products but cost performance products. We are trying our effort to make this powerful alliance a raw material supplier of trust worthy and of good competition for friction.

Booth: 66

Measuring & Testing Technology Made in Germany



Your Partner in high-end metrology for dynamic testing.

Booth No: 45

Geometrical measurement | Shape evaluation | Disc thickness variation (DTV)
Correction interface | Quick change-over by self-adjustment | Parts handling
Fully-automated measuring machines for 100% testing | In-line integration | Post-process measuring

BLUM
NOVOTEST

www.blum-novotest.com

Technical and Cultural Visits



Die Gläserne Manufaktur

Tuesday 21 May, 10:00

Duration: 2 hours

EUR 17 per person, includes return transport to ICD (10 minutes' transfer)

Maximum number: 50

Back by popular demand, EuroBrake's trip to Die Gläserne Manufaktur, Volkswagen's 'Transparent Factory', demonstrates every detailed stage of the making of its luxury sedan 'The Phaeton' in exceptional surroundings.

With walls made almost entirely of glass, focus is on transparency of process – Volkswagen are proud to show up to 250 tourists per day the seamless transition from assembly line to visitor forum. There is a strong emphasis on

environmental awareness – the factory is free from smokestacks, loud noises and toxic by-products, and sits in impressive grounds with over 350 company planted trees surrounding the building.

The factory is built not on an industrial estate on the outskirts of Dresden, but in the very heart of the city, just 10 minutes walk from the Old Town.

Architect Prof. Dr. Gunter Henn explains that 'Die Gläserne Manufaktur exemplifies the demands of today's knowledge society, a society in which we require transparent working environments to ensure networked processes'.

Our technical visit to this unique and extraordinary building promises delegates a no-holds-barred view of this radical reinvention of car manufacturing



Albertinum – Gallery of Modern Art

Tuesday 21 May, 10:00

Duration: 2 hours

EUR 25 per person, includes entrance to the Gallery and return transport to ICD (20 minutes' transfer)

Maximum number: 25

From Caspar David Friedrich to Gerhard Richter: The Exhibition in the Albertinum contains masterpieces from the New Masters Gallery and the Sculpture Collection from 1800s by the Romantic painters as well as the 20th-century art and contemporary works. Walking through the Albertinum is like opening a museum-sized art history reference work and leafing through

its pages. Presented on simple black plinths and largely freestanding, the exhibited works show us the most diverse conceptions of three-dimensional art in their time.

This tour is tailored exclusively to EuroBrake delegates.

Book your visit or tour

Important

Places on the tours are subject to availability and will be allocated on a first-come, first-served basis.

A tour may be withdrawn in the event that it is undersubscribed.

To sign up, select the appropriate tour during your on-line registration. You will receive email confirmation shortly afterwards.

For assistance, email
Jules Baldwin
j.baldwin@fisita.com
or call +44 (0) 1279 883470

Discover Dresden



Following a successful EuroBrake in 2018, located in The Hague, we bid 'Vaarwel' to The Netherlands and return to Dresden, Germany in 2019 – the original venue where we first launched EuroBrake in 2012.

Dresden is the traditional capital of Saxony and the third largest city in eastern Germany after Berlin and Leipzig. It lies in the broad basin of the Elbe River between Meissen and Pirna, 19 miles north of the Czech border and 100 miles south of Berlin. Sheltering hills north and south of the Elbe valley contribute to the mild climate enjoyed by Dresden. Numerous parks and cultural monuments exist along the Elbe's course, particularly a steel bridge (1891–93), a cable railway (1898–1901), and a funicular (1894–95).

The city is rich with cultural and artistic history; the great operatic composer Wilhelm Wagner debuted a number of works here in the 1800s and, today, an independent light opera company keeps the classical art form modern and fresh. Culture vultures will love the Gemäldegalerie Alte Meister and Grünes Gewölbe museums, and architecture buffs will salivate over the mélange of styles reflected in the cityscape.





For those visiting Dresden for the first time, a casual stroll around the Old Town is easily achieved from the conference centre and offers delights such as the famous Semper Opera House, known for its premieres including major works by Wagner and Strauss, the Fürstenzug, a grand mural of a mounted procession of the rulers of Saxony, and the Grünes Gewölbe (Green Vault), a museum containing the largest collection of treasures in Europe.

More regular visitors to the area may wish to explore sights further from the beaten track. The Elbe Sandstone Mountains just outside the city offer fantastic hiking opportunities with unparalleled views and diverse terrain. Other notable attractions include the Dresden Armoury, the Transport Museum, the Dresden suspension railway (opened in 1901) and the beloved "Blue Wonder" bridge – allegedly originally green.

Across the river, New Town is a favourite hangout for those seeking bustling bars and beautiful boutique shops on tree-lined streets. At night, locals pour into lively bars, or cross back over the river to the paved streets surrounding the magnificent Frauenkirche, where a plethora of high-quality restaurants cater for all tastes with a wide range of traditional German fare and international delicacies.

For more information visit: www.dresden.de

Did you know?

- Another nickname for Dresden is "Jewel Box".
 - Dresden hosts one of the largest porcelain tile artworks in the world.
 - Dresden is one of the greenest cities in Europe – 63% of the city is covered in green areas and forests.
 - The most prominent university in Dresden is The Dresden University of Technology. There is no need to wonder that technology is considered as the major sources of economy in the city. It earns the title as Silicon Saxony.
-

Social Programme



Welcome Reception

Sponsored by



Exhibition Hall

Tuesday 21 May 18:00 – 19:30

Meet your fellow EuroBrake participants over drinks and snacks in the Exhibition Area. All participants (Delegates, Exhibitors and accompanying person) are welcome. Don't forget to bring your conference badges and collect your welcome pack from registration desks on Tuesday 21 May.

Drinks Reception

Sponsored by



Terrace

Wednesday 22 May 18:00 – 19:00

Wind down after a busy day's networking with the EuroBrake Drinks Reception. Free of charge to full EuroBrake participants (Expo-only passes do not include entry to the Drinks Reception or the EuroBrake Dinner unless additionally purchased).

EuroBrake Dinner

Sponsored by



Terrace Level

Wednesday 22 May 19:00 – 22:30

A highlight of EuroBrake is always the Dinner. This year it will be hosted at the Terrace Level of the International Congress Centre with its stunning views over the River Elbe and historic city of Dresden.

Featuring the EuroBrake Awards

Best Written Paper, EuroBrake 2018



Dr. Jinghan Tang,

University of Bradford, UK

Experimental Investigation of the Dynamic Thermal Deformation and Judder of a Ventilated Disc Brake

Best Presentation, EuroBrake 2018



Dr. Jens Bauer,

Continental Teves, Germany

Boundary Conditions in Test and Simulation and their Influence on the NVH Behaviour

Free of charge to full EuroBrake participants.

(Expo Only passes do not include entry to the EuroBrake Dinner)

Farewell Reception

Foyer

Thursday 23 May 16:40 – 18:00

All participants are invited to attend the Farewell Reception where you can say goodbye to friends and colleagues new and old, in a relaxing atmosphere reflecting on your experiences in Dresden and make plans to keep in contact.

Free of charge to all EuroBrake participants.

Delegate Registration



For exhibitor or sponsor registration, please contact:

Kerry McDiarmid –
k.mcdiarmid@fisita.com

An email will then be sent to the main sponsorship/exhibition contact with details of how to claim your complimentary passes that are included in your package.

Delegate registration includes:

Admission to all Plenary and Technical Sessions
 Admission to the EuroBrake Dinner (strictly limited availability)
 Admission to the Exhibition
 Access to the EuroBrake app including all abstracts
 Conference Proceedings USB stick
 Admission to the Welcome and Farewell Receptions
 Coffee / Refreshments
 Lunches

Expo only registration includes:

Admission to the Exhibition
 Access to the EuroBrake app including all abstracts
 Admission to the Welcome and Farewell Receptions
 Coffee / Refreshments
 Lunches

Register Today!

To register for EuroBrake 2019 please visit the web site: www.eurobrake.net/register

Payment can be made by bank transfer or credit card using our secure online payment system.

	3 days Early Bird (before 19 March)	3 days (standard)	2 days Early Bird (before 19 March)	2 days (standard)	1 day Early Bird (before 19 March)	1 day (standard)
Delegate	910	1140	620	780	310	390
FISITA Member Society (10% Discounts)¹	819	1026	558	702	279	351
Speakers and Chairs (45% Discount)²	500	500	340	340	170	170
Academic Delegates 30% discounts³	635	800	430	550	215	275
Students⁴	165	165	165	165	165	165
Expo only	180	230	120	160	60	80

Note: All prices are subject to Germany VAT (value added tax) at 19%.

For more information or help with registration, please call: **+44 (0) 1279 883 470** or email **h.evans@fisita.com**

1. Current members of any of FISITA's Member Societies.
2. Speakers are entitled to one registration per paper at the discounted speaker rate.
3. To receive the Academic Discount of 30%, before registering please email Hannah Evans at h.evans@fisita.com for your unique registration code. Failure to do so will result in full price registration.
4. Proof of current full-time student status is required, please email Hannah Evans at h.evans@fisita.com.
5. Expo only registration does not include admission to the Drinks Reception or the EuroBrake Dinner.

Accommodation



Dresden has a wide range of hotels and accommodation. The Maritim Hotel is conveniently located opposite the conference centre, and other listed hotels are within easy walking distance.

Special rates have been negotiated for EuroBrake participants at the following hotels.

Maritim Hotel & Internationales Congress Center Dresden – 4* star

Maritim Hotel & Internationales Congress Center Dresden
Devrientstr. 10 - 12 / Ostra-Ufer 2, 01067 Dresden
Telephone: +49 (0) 351 216-0 Fax: +49 (0) 351 216-1000
Reservation number: +49 (0) 351 216-1018 Email: info.dre@maritim.de
Website: www.maritim.com

Location

On the banks of the Elbe, between the Semperoper and the International Congress Centre.

The Old Town with the famous Frauenkirche ("Church of Our Lady") and the Zwinger are just 10 minutes away on foot.

Room Rates - special rates secured until 12 April 2019

Earlybird – until 6 March 2019

Single occupancy room: from EUR 111.00 excluding city tax

Double occupancy room: from EUR 134.00 excluding city tax

Standard – until 12 April 2019

Single occupancy room: from EUR 117.00 excluding city tax

Double occupancy room: from EUR 140.00 excluding city tax



Hotel Taschenbergpalais Kempinski Dresden – 5* star

01067 Dresden, Germany
Telephone: +49 351 4912 0 Fax: +49 351 4912 812
Email: meetings.taschenbergpalais@kempinski.com Website: www.kempinski.com/dresden

Location

Grand Hotel Taschenbergpalais Kempinski is located directly in Dresden's historic city centre "Innere Altstadt" - only a few steps away from the most renowned sights, such as Semper Opera House, Royal Palace, Zwinger and the Church of Our Lady (Frauenkirche). Approximately 15 minutes' walk from the ICD.

Room Rates - special rates secured until 21 March 2019

Standard room

Single occupancy EUR 155.00 excluding city tax

Double occupancy EUR 175.00 excluding city tax

Superior room

Single occupancy EUR 175.00 excluding city tax

Double occupancy EUR 195.00 excluding city tax

To book the special rates please use the code "EuroBrake 2019".





Hilton Dresden – 4* star

An der Frauenkirche 5, 01067 Dresden
Telephone: +49 351 86420 Email: info@hiltondresden.com Website: hilton.com

Location

An historic Dresden hotel next to the Frauenkirche.

Overlooking Elbe River and the famous Church of Our Lady, Hilton Dresden is ideally located in the heart of this historic city allowing easy access to all major monuments.

They offer an extraordinary stay, with restaurants and cafés serving everything from Mediterranean cuisine and perfect steaks to local fare and delicious ice cream. Stay active at our LivingWell Health Club with a 1,100 square metre gym and benefit of their exclusive Executive Lounge.

Room Rates – special rates secured until 21 April 2019

Single occupancy room EUR 129.00 excluding city tax
Double/twin room EUR 154.00 excluding city tax

To book the special rates please use the following booking link:
<http://group.hilton.com/EuroBrake-2019>



Leonardo Hotel Dresden Altstadt – 3* star

Magdeburger Straße 1A, 01067 Dresden
Telephone: +49 (0)351 - 486 700 Email: info.dresden@leonardo-hotels.com
Website: www.leonardo-hotels.de/leonardo-hotel-dresden-altstadt

Location

The Leonardo Hotel Dresden Altstadt is ideally located only 1 km away from the famous old town and the beautiful River Elbe promenade. Business travellers profit from the proximity to the International Congress Centre.

Room Rates – special rates secured until 22 April 2019

Single occupancy room EUR 89.00 excluding city tax
Double/twin room EUR 111.00 excluding city tax

To book the special rates please use the code "EuroBrake".



Alternative hotels in Dresden:

The Westin Bellevue, Dresden – 4 Star

Große Meißner Str. 15, 01097 Dresden, Germany
Telephone: +49 4935 18050
Email: hotelinfo@westin-bellevue.com
Website: westinbellevuedresden.com

B&B Hotel Dresden – 4 Star

Weißeritzstraße 10, 01067 Dresden, Germany
Telephone: +49 351 652360
Email: dresden@hotelbb.com
Website: hotelbb.de

QF Hotel Dresden – 4 Star

Neumarkt 1, 01067 Dresden, Germany
Telephone: +49 351 5633090
Email: info@qf-hotel.de
Website: <http://qf-hotel.de>

Hotel Motel One Dresden am Zwinger – 4 Star

Postpl. 5, 01067 Dresden, Germany
Telephone: +49 351 438380
Email: dresden-am-zwinger@motel-one.com
Website: motel-one.com

Hofgarten 1824 – 3 Star

Theresienstraße 5, 01097 Dresden, Germany
Telephone: +49 351 2502828
Email: reservierung@hofgarten1824.de
Website: hofgarten1824.de



Language

The official language of the conference is English.

Programme Changes

The organisers are not liable for any changes made to the programme. Please visit the web site regularly for updates.

Final Programme

The Final Programme will be provided on-site in the delegate bag.

Official Conference App

The EuroBrake 2019 App is downloadable from all major app stores and will contain the most up to date conference information, including live technical programme updates.

Venue

EuroBrake 2019 will take place at the Internationales Congress Center Dresden (ICD). The ICD is a state-of-the-art conference centre located in the city's old town on the bank of the River Elbe.

Address:

Maritim Hotel & Internationales Congress Center Dresden
Ostra-Ufer 2 / Devrientstr. 10 – 12
01067 Dresden

Entry into Germany

EU-Citizens

No visa required. Entry is allowed with both passport and id-card.

Non-EU-Citizens

Any foreign visitor entering Germany must have a valid passport. Visitors from countries whose citizens require visas should apply to the German consulate or diplomatic mission in their own country.

To view a list of countries whose citizens require a visa to enter Germany please visit: www.germany-visa.org/do-i-need-a-visa/

Do you require a visa application letter? When registering online you will be given the option to request a visa, should you require a visa please ensure you select 'yes' when registering online. If you have any further questions, please email Hannah Evans at h.evans@fisita.com

Germany

Dresden is in the Central European time zone. Central European Standard Time (CET) is 1 hour ahead of Greenwich Mean Time (GMT).

Climate

The amount of rain in May is normal with an average of 63mm (2.5in). The average maximum temperature lies around 18.0°C (64.4°F).

Currency

The official German currency is the EURO. Traveller's Cheques are accepted by all banks and major hotels in principal cities. Their use in Germany for general purposes is not as popular as in some other countries, and may incur additional charges. International credit cards are accepted in hotels, department stores and restaurants. They are not widely accepted in smaller shops such as bakeries, butchers and news vendors where only cash is accepted or the German EC card. All convertible foreign currencies (www.oanda.com) are exchangeable at all major banks.

Business hours of most banks are

08:00 – 20:00	(Mon-Fri)
08:00 – 18:00	(Sat)
10:00 – 18:00	(Sun)

Tipping and Etiquette

Service charges and VAT are generally included in the price. It is typical to "round up" the price by 5 - 10% to amount to a round figure.

Shopping

Shops in central Dresden are usually open Monday to Saturday from 10:00-20:00. The Altmarkt-Galerie in the centre of Dresden is open until 21:00. Large supermarkets and shopping centres are open until 22:00. On Sundays, shops are closed, with some exceptions such as bakeries, train stations and petrol stations.



Pharmacies

Pharmacies can be found all over Dresden city and an emergency rota service provides care after-hours or on Sunday or bank holidays. To locate a pharmacy call: +49 (0) 351 8042251

Tax

The city of Dresden levies a Visitors Tax of EUR 1.30 per adult, per day. This additional tax is collected by the owner of the accommodation you are staying at. German Value Added Tax is included in all prices. Currently this tax is levied at 19%.

Electricity

Electric current in Germany is without exception AC 230V/50Hz. Sockets only fit round two-pin plugs (use of adapters is necessary for all devices).

Insurance

Participants are strongly advised to obtain travel insurance (medical, personal accident and luggage) in their home country prior to departure.

Public Transport

Dresden has a very well developed public transport system. Trams and buses in the city centre are operated by the Dresden Transport Services and regional transport is taken over by the Oberelbe Transport Services. Tickets can be bought on board the trams and buses, at stops and at service points. Riding without a valid ticket will result in a fine. City trains also run in Dresden and the surrounding area. Travel centres in the Dresden Hauptbahnhof (main train station) and in Dresden-Newstadt will provide you with further information.

Taxis

It is not customary to flag down a taxi cab. Instead, there are many taxi-stops in the city and you can order a taxi by telephone. Prices are set according to a basic charge and a set price per kilometre.

A taxi from the Dresden Airport to the ICD costs approximately EUR 27-30.

Getting to Dresden

Dresden is easily reached by air, rail or road.

The city's international airport connects you with all major German cities and hubs, as well as over 40 international destinations.

Dresden's main railway station, Dresden Hauptbahnhof, has excellent local, national and international links.

The city is well connected with the German Highway system.





Commercial Opportunities



FISITA will be pleased to support your organisation's marketing strategies and assist in the management of your sponsorship and exhibition requirements.

Gain high visibility at our events:

- **FISITA PLUS**
- **FISITA 2020**
- **FISITA World Mobility Summit 2019**
- **EuroBrake 2019**

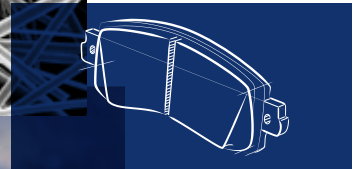
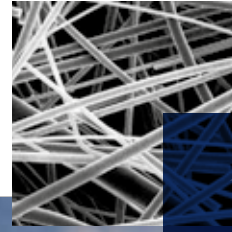
We would be pleased to speak with you in more detail about the packages on offer - some of our sponsorship opportunities can be secured for more than one year. We can also tailor sponsorship, advertising and exhibition packages to suit your specific business requirements.

For more information about the commercial opportunities available please contact:

Nadine Lloyd, Marketing Consultant
 +44 (0) 1279 883 473
n.lloyd@fisita.com

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