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Professional
MotorSport
WORLD EXPO 2017

15, 16, 17 NOVEMBER 2017
COLOGNE, GERMANY

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FREE-TO-ATTEND TECHNOLOGY PRESENTATIONS AND TECHNICAL WORKSHOPS

For 2017 we've added even more workshops and technology presentations. The workshops and presentations will be running on all three days of the show on two separate stages. All presentations will be in English

TECHNOLOGY PRESENTATIONS

Sessions will cover:

DAY 1

Motorsport Engineering & Race Car Optimisation Technology

DAY 2

Electrification & Hybridisation

DAY 3

Telemetry calibration, testing & data

WORKSHOPS

Sessions will cover:

DAY 1

Morning workshop 1: Simulation in action – how to get results

Morning workshop 2: Is there an optimum setup?

Afternoon workshop 1: Next-generation Motorsport ABS

Afternoon workshop 2: How to set up a LapSim simulation model

DAY 2

Morning workshop 1: Creating efficient simulation models from K&C testing

Morning workshop 2: Basic calculations for understanding the handling of your race car

Afternoon workshop 1: Motorsport suspension design methodology

Afternoon workshop 2: Chassis, tyre and aerodynamic setup

DAY 3

Morning workshop 1: Design and manufacturing of a GT car for endurance racing

Morning workshop 2: Tuning the modern race car

Afternoon workshop 1: Special session – Setup for the Nordschleife



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the track and at home, are leading to a fundamental change in the telemetry solutions offered. This workshop will look at the telemetry requirements for teams, manufacturers, the series and the fans, and what this means for the future.

Reliable race telemetry over 3G and 4G cellular networks

Dr Carsten Hoelper, head of UAV systems, SI-Schweitzer Ingenieur GmbH, GERMANY

This talk will present a reliable solution to sense data in the race car, transmit the data via multiple networks and display the data in the box, highlighting crucial information in the MMI.

Data analysis with the use of race car multibody model

Dr Petr Porteš, associate professor, Brno University of Technology, CZECH REPUBLIC

The topic of the presentation is a novel approach that utilises multibody models for data analysis. This approach directly interconnects measured data with a detailed inverse multibody model of the vehicle, thus eliminating the need for conventional simulation. It also enables us to obtain additional useful data about vehicle behaviour. Using the presented method it is possible to calculate unmeasured signals, identify unknown parameters of the vehicle and visualise measured states, thus advancing the process of data analysis to a level comparable to the level provided by conventional simulation, but now based on the actual manoeuvre and parameters.

Simulating high-performance engines for drivetrain testing using torque pulsations

Andy Gardner, sales manager, Unico (UK) Ltd, UK

The cost of running live race engines on a testbed, along with supplying fuel and removing exhaust gases, makes testing using an electric motor an attractive alternative. Technology can take a high-resolution model of a race engine's output and lock the resulting profile to the rotational position of an electric motor shaft. Moreover, this model can be dynamically updated up to 50 times per second to reflect changes in torque and speed. Combined with high-performance absorbers on a testbed, this is the closest thing to bringing the circuit into the lab to test transmission components.

System optimisation for automated calibration of ECU torque model

Andre Sell, CEO, SGE, GERMANY

A new approach to system optimisation allows the automated calibration of ECU functions on the basis of measured or modelled data by simultaneously optimising all calibration parameters. This innovative method has been successfully applied by multiple OEMs in cooperation with the SGE Ingenieur GmbH. In this way, the ECU torque model of a turbocharged engine can be calibrated at high accuracy within a day using a few hours of measuring time at the test rig and following automated evaluation.

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Additive manufacturing & rapid prototyping

Innovative engineering and additive manufacturing for successful combination on-and off-track

Emanuele Grotti, assistant production manager, CRP Technology, ITALY

The presentation describes how it is possible to push the boundaries of conventional design and launch a revolutionary approach in motorsport thanks to additive manufacturing and windform composite materials. It analyses the production of an intake manifold with SLS technology and how it is possible to mount it directly to the engine. This composite material's toughness and heat deflection temperature allow the part to be built in five days and then raced in the endurance series. The engine is run under boost, so it sees pressure variation in addition to the vibration, shock and temperature changes associated with racing.

WORKSHOPS

DAY 1

WEDNESDAY 15 NOVEMBER

Morning Workshop 1: Combining Lap Time and Driver in the loop simulation - Key lessons that have been learnt

Danny Nowlan, director, ChassisSim Technologies, AUSTRALIA

Driver in the loop simulation is a key part of the motorsport landscape. However like with anything there are benefits and pitfalls as well. During the development of ChassisSim Driver in the loop key lessons have been learnt about how to combine both lap time and driver in the loop simulation software. This presentation will discuss what you need to focus on to get the maximum benefit of both of these tools. Topics covered include: *How to make the most of both Lap time simulation and driver in the loop simulation. *Where to focus your attention in vehicle modelling to ensure what you do with lap time simulation applies for driver in the loop simulation. *Where to focus your attention on rig setup. In particular what counts and what doesn't. *The results that have been achieved so far and what has been learnt.

Morning Workshop 2: Is there an optimum setup?

Prof Michael Trzesniowski, FH-Prof., FH Joanneum, AUSTRIA

This workshop will discuss the most important tuning tools and useful performance indicators. The influence of tyres will be explained with the help of the handling curve. Furthermore, additional effects of wheel-load transfer, tractive forces and compliances will be explained. Using the Milliken Moment method (yaw moment diagram), further key performance indicators will be presented, such as trimmed resp. maximum lateral acceleration, directional stability, available control, available steer, steering sensitivity, yaw stability, etc. The role of simulation will be demonstrated employing aerodynamics. Eventually, the influence of the driver, their driving style and the choice of the driving line lead to the answer to the question.

CONTINUED ON REVERSE →

Afternoon workshop 1: Next-generation Motorsport ABS

Florian Giura, project manager and application Motorsport ABS, Bosch Motorsport, GERMANY

Safely across the finish line: the ABS function is always a balance between driveability and brake performance. In motorsport, the balance shifts considerably towards brake performance. The convincing ABS systems from Bosch Motorsport prevent wheel lock-up while maintaining controlled slip. This is all possible thanks to unique and easily adjustable control settings specifically designed with competition in mind. This is where the experience lies – Bosch Motorsport has been performing pioneering work for Motorsport ABS development for a decade. The next-generation Motorsport ABS sets astonishing standards with enhanced brake performance and many other fully optimised factors.

Afternoon workshop 2: How to set up a LapSim simulation model

Chris van Rutten, LapSim developer, Bosch Motorsport, GERMANY

Simulation enables users to gain a proper understanding of their vehicles and how the different parts influence performance. This is valid as long as the model has a good correlation with the reality. In this presentation we will demonstrate how you can build such a model based on on-car recorded data, using our freely available LapSim software. After the workshop you should be able to perform the same exercise for your own vehicle. Furthermore, we will also outline the underlying simplifications of the model and the limitations of the simulation model this causes.

DAY 2

THURSDAY 16 NOVEMBER

Morning workshop 1: Creating efficient simulation models from K&C testing

David Dabbs, senior engineer - vehicle dynamics, Horiba MIRA, UK

The advent of real-time simulation for the automotive industry has resulted in a number of software applications that rely on K&C test data to build a parametrised model of a vehicle. Models can be produced directly from the sort of test data that is already collected as part of any vehicle development process. MIRA has two K&C machines, including one that can measure the necessary vehicle inertia characteristics. This presentation will discuss the testing required to populate a parametrised model and what that model can do for motorsport. An example will be shown from the VI-grade CarRealTime application.

Morning Workshop 2: Basic calculations for understanding the handling of your race car

Ton Serné, handling engineer, Serné CM, NETHERLANDS

When racing, an existing type of car is being used in most cases. But how well do we know this car? What do we know about the roll centres, roll moment, roll resistance, weight

transfer, aero balance, etc? In this session we will explain how to measure the useful dimensions of your car (roll centres, motion ratios, height CofG, etc.) and how to use this data to perform calculations to better understand the handling of your car.

Afternoon Workshop 1: Motorsport suspension design methodology

Terence Goad, engineer, Performance Projects Ltd, UK

Performance Projects designs a wide range of vehicles, from autonomous off-highway to top-flight motorsport. The clear, structured processes used ensure an efficient and thorough method of design, proved for suspension systems, recently including Formula 1 and Time Attack. Questions will be welcome at various points during and after the presentation.

Afternoon Workshop 2: Chassis, tyre and aerodynamic setup

Martin Flick, head of motorsport, Thyssenkrupp Bilstein, GERMANY

A short presentation followed by an open audience discussion exploring the best techniques for maximum performance.

DAY 3

FRIDAY 17 NOVEMBER

Morning workshop 1: Design and manufacturing of a GT car for endurance racing

Nicola Scimeca, managing director, Ycom Srl, ITALY

The workshop will go through the complete process of design, manufacturing and development of a GT car for endurance racing with particular focus on the 24 hours of Le Mans. It will take as an example the Lotus Evora GTE developed by Ycom for Lotus. It was an extremely challenging project due to the regulation constraints, the car's handicap compared with the competition, and the restricted time available. It was an extremely successful story and the presentation will go deeply into the detail of the design and development of a racing car nowadays.

Morning workshop 2: Tuning the modern race car

Angus Lyon, director, Rockfort Engineering Ltd, UK

With the gap in performance between modern race cars reducing, being able to get the maximum out of a car is more important than ever. In the modern era, simulation and efficiency are key tools that are ever more vital in extracting the best out of a car. In this talk, Angus Lyon from Rockfort Engineering Ltd will explain how these tools are being used to improve performance in Formula 1 and Formula E and how they are equally relevant to all levels of motorsport.

Afternoon Workshop 1: Special session – Setup for the Nordschleife

Daniel Sorg, Sorg Rennsport.

Synopsis to follow. Check website for latest updates

**This program may be subject to change*

TECHNOLOGY PRESENTATIONS

DAY 1

WEDNESDAY 15 NOVEMBER

Motorsport Technology Presentations Stage

Motorsport Engineering & Race Car Optimisation Technology

Aerodynamic optimisation of existing race cars

*Prof Ralph Pütz, chairman and CEO, Belicon GmbH
- Vehicle Research, GERMANY*

The aerodynamic optimisation of existing race cars, especially those from historical racing series, is easily possible with the support of modern computer-aided development tools. As examples, a modern Formula V and a Reynard Formula 3 race car have been analysed. Usually, detailed drawings are not available in sufficient quality, so before conducting the CFD analysis it is necessary to 3D scan the vehicles to be analysed/optimised. The Formula V racing car was scanned in its entirety, fed into a CFD analyser, and the results were finally verified on a 3D rapid prototyping model in the wind tunnel.

Intelligent real-time power management – replacing static anti-lag, launch-control, etc. maps

Oskar Elmgren, CTO/CSO, Elmer Racing, FINLAND

The state of the art in turbocharged racing engine throttle response mapping has long been the traditional static look-up table. With either corrections or multiple maps being the latest developments. This is inadequate for achieving the best possible performance under every possible situation. We have varying inlet temperatures, compressor surge areas, transient engine conditions and choke conditions at the inlet restrictor. To achieve optimum performance we need a real-time, fully active and responsive system. A system capable of detecting limiting conditions and applying the optimal system output of all variables in all situations. And we need this before the competition!

Design and ALM production of a race car upright

*Frédéric Impellizzeri, auto business unit manager,
Poly-Shape, FRANCE*

Improving the performance of one area of a car often requires you to develop other areas. A more efficient aerodynamic package, together with specifically designed tyres and wheels increased in size from 13" to 18", combine to give superior grip. New uprights capable of withstanding an improved loading have been designed using a new approach called Topologic Optimisation, which is essentially where a block of space is considered and subjected to the load case of the desired part while iterative calculation is used to remove material from areas where there is no mechanical stress and, therefore, no strength required.

Development & features of the Porsche 911 GT3 Cup (991) GenII race car

*Christoph Werner, Product Manager, Porsche,
GERMANY*

"Porsche's 911 GT3 Cup has become one of the most sought-after race cars in customer racing today. It has proven to be one of the most successful for some time: with more than 3,500 examples made and has been the car of choice for the Porsche One-Make-Series since 1990. This presentation illustrates the steps in the development process from the 911 GT3 Cup (991) GenI to the 911 GT3 Cup (991) GenII car, highlighting new technical features of the car designed to further improve the performance, driveability, and reliability of the vehicle."

LUNCH

Outbrake your competition - Solutions for in-house brake package development and optimization

*Matthias Dank, global business segment manager
racing, AVL, AUSTRIA*

Braking performance can be the difference between winning and losing on a race weekend. Component quality and thermal management of the system can extract the maximum performance and durability from the brake package. Efficiency of testing in realistic conditions is thus necessary for reliable and valuable results, but tight competition, limited testing time and resources pose additional challenges and limitations. How can development time and track testing efforts be optimised? How is it possible to closely simulate track conditions in order to understand the complex, transient thermal behaviour of the brakes in-house? AVL Racing has the answers.

Precision wireless hub plate scale system from Intercomp

*Bruce Rhoe, automotive sales manager, Intercomp,
USA*

Intercomp's precision wireless hub scale system was the first commercially available system with the scale built into the hub stand. It comes standard with wireless communication to a control box or a laptop, which comes integrated with Intercomp's RaceWeigh software. The systems design simplifies chassis measurement and adjustment, and allows operation to be easily carried out by one person, eliminating 99% of human error. Intercomp's hub scale system is compatible with vehicles ranging from GT3 to Formula 1.

DAY 2

THURSDAY 16 NOVEMBER

Motorsport Technology Presentations Stage

Electrification and Hybridisation

The electrification of Motorsport and its effect on the transmission technology used

Adrian Moore, managing director, Xtrac Limited, UK

Electric racing is a hot topic with the growth of Formula E and other series. How does this change away from conventional ICEs to electric machines as the vehicles power source affect the transmission technology required? This presentation will

explore the growth of electric racing, look at the possibilities in the future, and will then cover the transmission requirements of an electric racing car. Certain key transmission technologies will be discussed, and how those technologies can be directly applicable to high performance road electric vehicles

Manufacturing the carbon-fibre Formula E motor housing

Chris Norris, senior design engineer, Swift Engineering Inc, USA

Swift Engineering was hired to perform design and fabrication of a carbon-fibre motor housing used in the drivetrain assembly of the Formula E race car. The intention was to design a new motor housing that would accommodate a new electric drive motor and form the structural connection between the monocoque chassis and the transmission, while reducing the weight, but maintaining structural integrity. Discussed are the manufacturing and design techniques taken to meet the high performance requirements and compressed schedule, while creating an overall structure with a 28% increase in torsional stiffness and 35% weight reduction compared with its original metallic component.

Electrification in motorsport

Douglas Campling, chief engineer, motorsport, Williams F1, UK

The presentation will discuss Williams Advanced Engineering's involvement in supporting batteries for the Formula E race series. It will also cover skill transfer from F1 across into Formula E.

LUNCH

The past, present and future of electric motorsport

Sam Guest, business development manager - electric power systems, MTS Systems, UK

MTS has been at the forefront of the electrification of motorsport since the introduction of KERS technology in Formula 1 in 2008. This presentation will review the evolution of electric drives from early KERS to the modern F1 powertrain, and the new challenges being presented by the rapid growth of Formula E.

Evolution of hybrid systems in F1

Riccardo de Filippi, head of development, Magneti Marelli, ITALY

The presentation will cover the evolution of hybrid systems in F1, from the introduction of KERS in 2008 until today. This will include the evolution of the ERS inverter, and how the K and H characteristics had an impact on the design, as well as covering how alternators were replaced in F1 by a DC/DC converter. The presentation will also consider the next technological steps in hybrid system development.

**20+ TECHNICAL
PRESENTATIONS**



11 WORKSHOPS

Motorsport Technology Presentations Stage

Hyundai i30 N TCR, piezo electric fuel injectors and additive manufacturing

The i30 N TCR - an overview of the first circuit car from Hyundai Motorsport

Stefan Henrich, marketing and PR director, Hyundai Motorsport GmbH, GERMANY

This presentation will cover the design, development, test and capabilities of the i30 N TCR, the exciting new car from Hyundai Motorsport.

Why manufacturers consider piezoelectric fuel injectors

Milan Spicak, senior applications engineer, Cosworth Electronics, UK

The presentation will discuss: technologies used for direct fuel injection; direct fuel injection automotive vs. motorsport applications; the benefits and disadvantages of piezoelectric technology; why manufacturers do or don't consider piezoelectric technology for fuel injection; Cosworth IDU1-PZ (piezoelectric injector driver unit), development and application; the benefits that Cosworth hardware and software deliver.

Additive manufacturing in racing - lightweight design and quick iterations

Amos Breyfogle, senior engineer, Stratasys GmbH, GERMANY

Additive manufacturing is reshaping the way that many industries manufacture goods. As with many cutting-edge manufacturing technologies, automotive racing is taking advantage of this opportunity. This session will take an in-depth look at the many uses of additive manufacturing in the motorsport industry. It will showcase several examples from McLaren's F1 team, Team Penske, and others. We will look at uses from prototyping for quick iterations in design and testing, tooling for rapidly produced high-temperature composite tools, and finally at direct production of parts that are being used on the vehicles themselves.

DAY 3

FRIDAY 17 NOVEMBER

Motorsport Technology Presentations Stage

Telemetry, calibration, testing and data

Motorsport telemetry - what does the future hold?

James Shingleton, business development director, bf1systems, UK

Motorsport telemetry systems have relied on traditional radio systems since their introduction. Now, with the rapid development of the cellular network and M2M communications, these advances in technology, coupled with the desire to improve the spectacle of motorsport for the spectators both at