JUNE 24 & 25, 2020 COLOGNE, GERMANY

Featuring three dedicated conference streams:

- **iVT AUTONOMOUS** Hardware, Software, Testing and Validation
- **iVT ELECTRIC, HYBRID** and Alternative Powertrain Solutions
- **iVT CAB DESIGN** Controls, Ergonomics and HMI

ADDRESS THE CRITICAL TRENDS SHAPING FUTURE INDUSTRIAL VEHICLE DEVELOPMENT

**PRELIMINARY PROGRAM**

An integral part of

**iVT EXPO**

www.ivtexpo.com

Association Partners:

- CALSTART
- CIMAC

Save up to €195
Discount applies for a limited time only!
ONE PASS GIVES YOU ACCESS TO ALL STREAMS!
One delegate pass gives you access to all three streams!

**AUTONOMOUS HARDWARE, SOFTWARE, TESTING AND VALIDATION**

The Autonomous Hardware, Software, Testing and Validation stream is exclusively dedicated to the design and development of highly automated and unmanned construction, mining, agricultural, industrial and off-highway vehicles. The stream will focus on case studies and applications, testing and validation, and simulation and software.

**ELECTRIC, HYBRID AND ALTERNATIVE POWERTRAIN SOLUTIONS**

The Electric, Hybrid and Alternative Powertrain Solutions stream is exclusively dedicated to the design and development of electric and hybrid vehicle technology for the construction, agricultural, industrial and off-highway vehicle industry.

**CAB DESIGN, CONTROLS, ERGONOMICS AND HMI**

The Cab Design, Controls, Ergonomics and HMI stream will explore next-generation cabin design and future technologies for industrial, commercial and off-highway vehicles. Topics will include enhanced productivity and operator comfort, display systems and electronics.

**First speakers announced**

Nick Moller
Conference director
nick.moller@ukimediaevents.com

**BOOK YOUR DELEGATE PASS NOW – GROUP DISCOUNTS ONLINE!**

**DELEGATE BENEFITS**

- Networking breakfast on Day 1
- Invitation to the drinks and networking reception evening
- Pre-conference coffee on arrival
- Assorted complimentary refreshments during the conference networking breaks
- Lunch and refreshments at Conference Dining
- Visitor Meetings & Relaxation Area
- Free-of-charge cloakroom
- Complimentary wi-fi

<table>
<thead>
<tr>
<th>PASSES</th>
<th>FULL RATE</th>
<th>EARLY-BOOKING DISCOUNT RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-DAY PASS</td>
<td>€1,950 + VAT</td>
<td>€1,755 + VAT</td>
</tr>
</tbody>
</table>

Discount applies for a limited time only!

Group Bookings
Receive an **extra 10% discount** on each registration for a group booking (2+ delegates) by making them on the same date, from the same company.

First speakers announced
Best practices learned in fielding autonomous tractors and trucks

Mel Torrie, CEO, Autonomous Solutions Inc, USA

ASI has been developing autonomous industrial vehicles for 20 years in markets including agriculture, mining and construction. The presentation will share the painfully learned lessons on that journey and case studies of projects in which they were learned. These lessons will touch on topics including hardware, software, system integration, testing, validation, change management and commissioning.

Intelligent perception for agricultural automation

Dr Edmond DuPont, principal engineer, Southwest Research Institute, USA

Autonomous vehicles for agricultural applications have grown in recent years as an emerging technology to support productivity and sustainability. Perception sensors integrated with artificial intelligence can be applied to various crop-related applications and support safe automated navigation, environment modeling and crop analysis. This work presents the application of cameras and lidar sensors to classify environmental features applicable to agricultural environments. The intelligent perception framework extracts the structural profile and spectral classification of vegetation that can support various automated tasks that include mowing, harvesting and baling.

Snow removal at airports: from vision to operation

John Emil Halden, acting manager, Yeti

Snow Technology AS, Norway

Yeti Snow Technology and Øveraa sen have won the world’s first commercial contract for delivery of autonomous snow removal equipment at airports. Over the next few years, the Swedish airport operator Swedavia will start using unmanned vehicles for winter maintenance of runways and taxiways at its airports. The presentation will cover the journey from the first vision of autonomous snow removal at airports to implementation at a major international airport in Scandinavia.

Software co-execution platform for connected off-highway machines

Adrien Mouaffo Tjadjo, IoT product manager, Bosch Rexroth AG, Germany

In the growing world of connected off-highway machines, new players are offering software solutions/digital services for end customers. Moreover, new business models are emerging, where these new players have to establish a long-term direct relationship with the machine owner/end customer in order to have a profitable business. To address these changes, Bosch Rexroth is setting up a software co-execution platform for connected off-highway machines, where different players can deploy, monitor and share software services. These software services are run on the Linux-based Rexroth Connectivity Unit and remotely managed using the Bosch Device Management Portal.

Coordinated mission management for multiple agricultural autonomous machines

Jorge Viramontes, engineer - autonomous systems, JCA Electronics, Canada

The introduction of agricultural autonomous machines presents an opportunity to shift from large machines toward solutions that use multiple smaller units to increase the efficiency, scalability and flexibility of farming operations.

This presentation will cover some of the main challenges and considerations associated with managing multi-machine systems, including path planning, real-time adaptive missions, communication architecture and data management across multiple machines.

Lidar contamination in off-road applications

Kristiaan De Meester, VP sales and business development, XenomatiX, Belgium

ADAS and AD applications are as important in off-road as they are in on-road – perhaps even more so. Although given less press attention, off-road applications benefit from confined areas to make fast progress in autonomous applications. The requirements for the sensor suite for off-road match most of the on-road requirements, with more importance placed on shock and contamination resistance. In some cases, such as mid-summer harvesting in Arizona, the functioning of the equipment depends on it, with or without autonomous driving. The paper describes the specific off-road requirements for lidar and discusses use cases and tests to validate the performance.

Intelligent construction machinery – component requirements, validation and testing

Dirk Brandenstein, engineer - construction equipment, AVL Tractor Engineering Germany GmbH, Germany

Due to the requirements of construction machines, new sensors are required that can withstand environmental influences. High availability is a key to success. This presentation will compare laser, ultrasound and radar sensors. It will also discuss the testing and validation of processes and systems, plus test processes for safe machines.

Connecting autonomous and assisted safe vehicles

Alexander Holler, general manager electronics division, Inter Control, Germany

Industrial vehicles are increasingly remotely accessible to allow effective fleet management and immediate service. The increasing number of semi-autonomous and autonomous vehicles underlines the need for safety considerations when accessing such vehicles. During this presentation, possible communication architectures and the required processes will be introduced. Special attention will be given to the transfer of mass data, utilization of standard protocols and interfaces as well as the transfer of safe software for remote update and parameter changes on the vehicle.

Safety mechanism for advanced driver assistance systems (ADAS)

Paria Amini, safety manager, Embotech AG and Rosas, Switzerland

Autonomous vehicles need to be designed with appropriate levels of safety in the hardware and software portions of the computational system. Most ADAS need to comply with ASIL D requirements. On the other hand, the ADAS/AD needs to be a failsafe operational system. Achieving both goals is a challenging task because, as an example, verification and validation of motion planning and decision-making systems is not practically feasible. The ASIL decomposition between nominal and safety blocks, along with a diverse-redundant concept – especially in the planning and tracking phase of the ADAS design – can be the key to such complex software.

*More speakers to be announced
From concept to reality – Volvo goes electric
Ahcène Nedjimi, electromobility specialist, Volvo Construction Equipment, Sweden

Volvo Group has shifted to electromobility throughout its business – from trucks and buses to marine and construction equipment. This presentation will discuss the market-leading innovation journey of Volvo CE as the company moves from prototype machines and research projects through to an industry-first commitment to stop development of diesel-based compact machines and the launch of their electric counterparts. It will address the challenges of adapting electromobility to the market, and also the successes that have emerged from customer trials, including the ECR25 Electric’s debut at the RHS Chelsea Flower Show in the UK.

Off-road is CORE to ZE success
Bill Van Amburg, executive vice president, Calstart, USA

California has just launched the Clean Off Road Equipment (CORE) incentive program, managed by Calstart and modeled on the successful HVIP on-road incentive program. CORE targets the leading equipment segments most ready for zero-emissions operations (terminal/yard tractors, TRUs, GSE, cargo lifts and other segments) and provides funding to cover incremental cost and infrastructure to help operators more quickly shift to cleaner equipment. Calstart will highlight how the programs work, the status of the eligible technologies, future equipment categories that could be included, how this will support the global market supply chain, and the applicability of this program to other regions.

System dynamics simulation for evaluation of energy-efficient compaction drives architecture
Dr Ashraf Zeid, principal engineer II - virtual product development, Volvo Construction Equipment, USA

This work presents the use of system dynamics simulation for the evaluation of architectural structure that may include various energy sources for compaction drives. We use simulation to quantify compaction performance in terms of energy usage and components value proposition. We use AMESIM as the system dynamics modeling environment. AMESIM allows us to explore various electric architectures and compare them with hydraulic architectures in terms of energy efficiency. This choice also allows us to use the system dynamics models that we built for trade-off studies in co-simulation mode as plant models for algorithmic controls development. Decoupled dynamics justify run-time efficiency.

Global off-highway vehicle electrification trends – forecast to 2030
Pietro Boggia, principal consultant, Frost & Sullivan, Spain

This presentation will take the audience through a recently published (November 2019) long-term forecast on OHV electrification trends at the global level. It will present a technology roadmap for OHV hybrid technology toward 2030 and beyond, introducing key drivers of electrification, and discussing market and technology trends and latest product advancements by OEMs. An off-highway equipment demand forecast will be revealed, predicting a brighter future for electrified machines. The market is expected to grow more than twofold by 2025. By 2030, the majority of OEMs will have ventured into the electrification domain.

Modular and scalable electric drive platform for non-road mobile machinery
Dr Markus Merkel, professor, Aalen University

This paper presents a modular and scalable electric drive platform for NRMMs. The platform is part of a research project called Mufle+ funded by the German Federal Ministry of Education and Research. The platform can be integrated into different machines with different performance classes. The modular and scalable electric drive platform will be demonstrated using the example of a hybrid multifunctional vehicle. The research project includes drive motors, power electronics and an intelligent control and cooling concept for the powertrain. The platform offers the possibility to integrate compact function-integrated components, which are produced by additive manufacturing.

Options for low-carbon mobile machinery
Alex Woodrow, managing director, Knibb Gormezano Limited, UK

With governments worldwide seeking to reduce GHG emissions, road transport is being targeted to shift to net-zero emissions. However, changes to the supply chain and energy system will disproportionately impact non-road mobile machinery manufacturers and end users, which benefit from close links to heavy road transport. The presentation will assess the benefits and challenges in the adoption of net zero in the agricultural, construction and materials handling segments.

Decarbonizing future powertrains
Dr Andrew Atkins, global technical lead and senior technologist, Ricardo UK Ltd, UK

Industrial vehicles pose a challenge to the engineer at a system level. It is imperative to decarbonize operations while remaining economically sustainable and clean. Coupled with challenging operational needs, a flexible approach to both use and storage of onboard energy is required. This paper reviews options we are assessing and how they might expedite adoption of environmentally beneficial technology.

Off-highway electrification: why now is the right time
Alastair Hayfield, research director, Interact Analysis, UK

This presentation will give an overview of the global off-highway vehicle market and forecast toward low- and zero-emission solutions. This will include a discussion on our approach of looking at vehicle application/duty cycle, and how this impacts the trend toward electrification. The speaker will also offer an insight into the industrial Li-ion battery market, forward production and pricing trends, and the impact on off-highway electrification uptake. An overview of urban low- and zero-emission zones, and how these are driving early adoption, will also be given. There will also be discussion of the impact of on-highway commercial vehicle market electrification, including technology transition/ migration and a detailed focus on China, and how new policies and company direction will impact the global market.
From components to innovative and efficient system solutions
Dierk Peitsmeyer, product portfolio manager, Bucher Hydraulics, Germany
It is not only efficient components that result in high energy-saving potential. It is also necessary to consider the system, the drivetrain and the duty cycles. The presentation will show different approaches.

Assessment of the electrification of a 3.5-ton compact excavator
Romain Nicolas, systems engineer - Simcenter Amesim for trucks, buses and off-highway applications, Siemens Digital Industry Software, France
Sebastian Schmid, solutions consultant, Siemens Digital Industries Software, Germany
Many drivers are in favor of electrification: low-emission zones, workplace emissions regulations, Stage V below 19kW. System simulation is a key asset for exploring electrification, by enabling the identification of electrical system requirements, supporting the pre-sizing of electric motor, power electronics and battery, and addressing the validation of components development versus system requirements (autonomy, aging, thermal management, power).

Digital Displacement – a new roadmap toward efficient hydraulic systems
Niall Caldwell, managing director, Artemis Intelligent Power Ltd, UK
Off-road vehicles contribute over 2% of global greenhouse gases. High energy use, tough environments, linear motions and cost pressures make electrification difficult. But there is low-hanging fruit: existing off-highway hydraulic systems waste 50-70% of the engine's useful energy. Digital Displacement technology offers the industry a new roadmap to deliver dramatic efficiency improvements in hydraulic systems, reducing emissions and fuel costs while increasing productivity. Focusing on excavators, the presentation will show the latest results on an evolutionary path from today's analog hydraulics toward fully digital hydraulic systems that will reduce fuel consumption (or battery size) by 50% or more.
How to profit from industrial design in cab development

Wanja S Steinmaier, managing partner, Lumod GmbH, Germany

Due to partially contradicting trends in the NRMM sector and therefore in the cab business, it is becoming increasingly essential to understand the specific needs of all stakeholders involved. Technical innovations, new processes and technologies constantly push the limits. But human desires and expectations are also changing. In this context, industrial design can play an important role and help businesses to thrive. This presentation will address some of the topics and show, with practical examples, how to use industrial design as a key factor of success.

Customized platform HMI toward Agriculture 4.0

Michael Jendis, executive director - commercial vehicles, Preh GmbH, Germany

Preh’s platform-based customized design has raised the bar of perceived quality, haptic and optic experience and technological content for tractor HMI. This journey has just started. Doing ‘more with less’ in agricultural business will move to the next level with teams of machines working beside each other. Postulating that platoons, autonomous tractors and robots will team up with a leader machine, the leader task pattern will make HMI different. This presentation will focus on leader machine HMI requirements, elements and innovative content based on customized platform modules.

How to keep up with the evolving world of HMI

Arno Purkrabek, team leader product management, TTControl, Austria

The ongoing evolution of mobile machinery and the increase in complexity in terms of functionality and vehicle system design have an impact on the requirements of operator interfaces. Besides the vehicle itself, the environment is coming increasingly into focus. Sensors and cameras in combination with operator assistance systems considerably increase the efficiency and profitability of mobile machinery. Mobile machinery OEMs are facing with less-skilled workers and will shift operator convenience and machine efficiency to a new level.

EVoR: enhanced view on reality

Luca Porcaro, project leader - electronic R&D, MTA SpA, Italy

The presentation will introduce an innovative head-up display (HUD) system with two different projection modes. Both systems feature laser projectors: a multicolor one with a microlens array screen and an ultraviolet one with a luminescent screen. The images coming from the two projectors are focused on the windshield, with a wide viewing area and visible from any cabin position.

A critical phase: cab installation – how to accelerate it?

Tiziano Zama, design consultant, international customer relations, Main Engineering Srl, San Marino

Vehicle design does not always consider all the necessary information about cab design. And vice versa. This can make the cab installation a critical phase that can slow down the whole project. It is possible to accelerate this phase by combining experience in vehicle engineering with indispensable skills for the development of cabs for industrial vehicles. The interpretation of technical needs, feasibility checks, project development and production support gives birth to a real project accelerator. The result is a perfectly integrated, technologically innovative and functional cab, with guaranteed, efficient industrialization that brings consistent savings in time, money and resources.

Automating industrial vehicle design with generative design

Jesse Coors-Blankenship, SVP of technology, PTC, USA

Automation has as much potential to reshape the design of industrial vehicles as it does to affect their operation. Generative design is an evolving CAD capability that leverages AI to automatically generate designs fulfilling the engineer’s system requirements. By generating designs that perform better and use less material than human-designed parts, generative will unlock a revolution in efficiency. Industrial vehicle designers will be able to optimize their designs for a range of requirements, be they structural or manufacturing constraints. As designers harness generative to iterate more quickly and create more efficient designs, a wave of unprecedented innovation will be unleashed.

**BOOK YOUR DELEGATE PASS NOW – GROUP DISCOUNTS ONLINE!**

<table>
<thead>
<tr>
<th>DELEGATE BENEFITS</th>
<th>2-DAY PASS</th>
<th>FULL RATE</th>
<th>EARLY-BOOKING DISCOUNT RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Networking breakfast on Day 1</td>
<td>€1,950 + VAT</td>
<td>€1,755 + VAT</td>
<td></td>
</tr>
<tr>
<td>Invitation to the drinks and networking reception evening</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-conference coffee on arrival</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assorted complimentary refreshments during the conference networking breaks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lunch and refreshments at Conference Dining</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visitor Meetings &amp; Relaxation Area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Free-of-charge cloakroom</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complimentary wi-fi</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Group Bookings**

Receive an extra 10% discount on each registration for a group booking (2+ delegates) by making them on the same date, from the same company.
Experimental results on dust removal by cabin flow modulation
Aki Komulainen, director - cabin technology, Fortaco Group Oy, Finland
Synopsis to follow.

Challenges of human-machine interfaces in automated machine operation
Dr Christoph Müller, CEO, MobileTronics GmbH, Germany
Not only based on the latest accidents, experience in aviation shows how critical the design of human-machine interfaces is. Using carefully investigated examples from aviation, the presentation will show how wrongly designed user interfaces, especially related to driver assistance systems, may make the operator erroneously rely on the electronic control, potentially leading to dangerous situations. It will then give examples of how driver assistance systems can be integrated into operator-centered design of the machine operation.

Using sound to enhance the quality of industrial vehicles
Charles Moritz, vice president of research and development, Blachford Acoustics Group, USA
The perception of high-quality sound from a machine depends on the human interface and the information that operators receive from the sound. Operators use acoustical input to judge the operation (speed, load), condition and quality of the machine in addition to visual indicators. Too much of the wrong sounds can lead to communications interference and perceptions of low quality. Not enough of the right sounds can lead to perceptions of low power and unmasking of buzz, squeak and rattle. With a deeper understanding of the cab acoustical environment, sound design practices increase the value of the industrial vehicle.

How in-glass laminated displays improve vehicle safety, ergonomics and UX
Thomas Koch, display expert, Beneq Oy, Finland
By laminating transparent displays in glass, industrial vehicle OEMs are empowered to utilize all the windshields and windows, showing important information and providing functions controlled by touching the glass. The technology enables manufacturers to build safer vehicles and machines that improve ergonomics and user experience for drivers, operators and passengers. Compared with a typical HUD, in-glass displays have the following advantages: the setup is simple because it is integrated seamlessly with the windshields and windows; the images are viewable from all angles inside and outside the vehicles; it works for vertical windshields.

*More speakers to be announced*
An integral part of

www.ivtexpo.com