iVT Industrial Vehicle POWERTRAIN TECHNOLOGY CONFERENCE

FEBRUARY 13-14, 2019
KÖLN MESSE, COLOGNE, GERMANY

DISCOVER THE NEXT GENERATION OF HIGH-EFFICIENCY POWERTRAIN SOLUTIONS FOR INDUSTRIAL AND OFF-HIGHWAY VEHICLES

PRELIMINARY PROGRAM

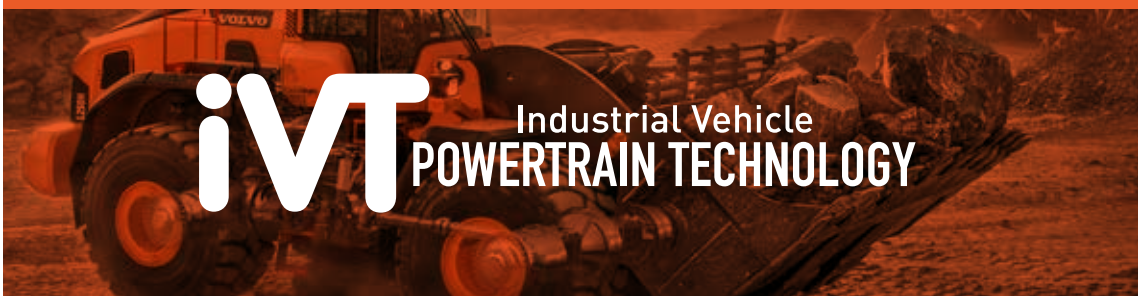
Taking place at

iVT EXPO
INDUSTRIAL VEHICLE TECHNOLOGY

For more information and to register for your place visit:

www.ivtexpo.com

INDUSTRIAL VEHICLE POWERTRAIN TECHNOLOGY CONFERENCE



Discover the Next Generation of High-Efficiency Powertrain Solutions for Industrial and Off-Highway Vehicles

The conference will explore the latest and next-generation transmission and driveline technologies for further efficiency, performance and reliability gains.

Hear from leading industry experts, network with over 350 delegates across four conferences. PLUS: Discover the next generation of industrial vehicle components, materials, concepts and manufacturing technologies at iVT EXPO – Entry included with your delegate pass!

A new conference for 2019 dedicated to exploring the latest and next-generation designs and technology for reducing CO_2, meeting future industry emission targets, improving performance, and increasing reliability and productivity through more traditional heavy-duty ICE engines, transmissions and complete drivetrain solutions.

REGISTER FOR YOUR DELEGATE PASS NOW – DISCOUNTS ONLINE!

2-DAY PASS
~~€1,950~~ €1,475 + VAT

***EARLY-BOOKING DISCOUNT!**
SAVE ALMOST
€500

DELEGATE BENEFITS

- **Networking drinks reception**
- **Free, three-course lunch each day in the VIP delegate & speaker dining area – ideal for networking**
- **Entry to three other parallel conferences**
- **Online access to the conference proceedings following the event (with speakers' permission)**

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.

* Book by December 31, 2018 **www.ivtexpo.com**

Association partners:

CIMAC INTERNATIONAL COUNCIL ON COMBUSTION ENGINES

CALSTART

FCHEA Fuel Cell & Hydrogen Energy Association

Parallel conferences:

iVT Industrial Vehicle CAB DESIGN & TECHNOLOGY

iVT AUTONOMOUS Industrial Vehicle Technology

iVT electric & hybrid industrial vehicle technology

DAY 1 WEDNESDAY FEBRUARY 13

Decarbonization of non-road machinery – scenarios for CO_2

Alex Woodrow, managing director, Knibb Gormezano and Partners, UK

This presentation will review the challenges for mass-market non-road segments, and provide an assessment of market segmentation and customer requirements. It will also discuss the impact of technology transfer from the CV segment and implications for engine and driveline.

Is there room for gasoline in a future industrial powertrain?

Dr Terry Alger, director, spark ignited engine R&D, powertrain engineering division, Southwest Research Institute, USA

With increased concern over air quality and CO_2 emissions, regulation of industrial and off-highway equipment will increase. Already, the EU and other regulatory bodies are beginning to examine even lower NOx and PM regulations. Traditionally, the torque and reliability of a diesel engine have made it the favored powerplant for industrial applications. However, the combination of advanced engine hardware and expensive, bulky aftertreatment systems makes the diesel engine of the future considerably more expensive – both to buy and operate – and challenging to package. Southwest Research Institute has been working on solutions for high-efficiency gasoline engines for the passenger car market and, based on these developments, has identified a technology package that is very attractive for large (> 110mm bore) displacement gasoline engines that run along the same torque curve as a diesel engine. The concept, called Dedicated EGR, uses a 'donor cylinder' model of EGR production, but with the addition of running the donor cylinder with excess gasoline. The gasoline is converted into H_2 and CO, both of which improve the dilution tolerance and knock resistance of the engine. The combination of high EGR rates and the knock resistance of the reformatted fuel add up to an engine with the potential to meet or beat diesel efficiency, depending on the ultimate displacement and specific power targets of the engine. This talk will cover the basics of Dedicated EGR and show some examples from large- and small-displacement engines to demonstrate the efficiency potential of the engine.

Advanced engine architecture for on and off-road reduced emissions

Larry Fromm, executive vice president, Achates Power, USA

With the advent of more stringent Tier 5 emissions regulations coupled with serious concerns raised by diesel emission compliance cheating incidents, the backbone diesel engine is facing significant challenges in meeting ever more demanding air quality and climate goals. One extremely promising technology – opposed piston engines – may alter that trajectory and create a new path forward for diesel. Achates Power has added state-of-the-art control systems and aftertreatment to the opposed piston design, leading to Class 8 engines capable of increasing best-in-class efficiency by 15% while still reducing NOx emissions by 90% under USEPA standards. This engine is already used in industrial applications and could become the future platform for competitive industrial vehicles. This presentation reviews the current status of the engine in military, truck and industrial uses and future pathways.

Off-highway vehicle powertrains: what is the best energy source?

Colin Garner, professor of applied thermodynamics, Loughborough University, UK

The presentation will compare IC engine, hybrid and battery-electric powertrains. The focus is non-tethered, mobile off-highway machines, but the analysis approach is applicable to other types of vehicles. It will discuss: global and local emissions (e.g. Stage V); energy and power; a direct numerical performance and cost comparison between IC engine/IC engine-hybrid and pure battery-electric powertrains based on current and future technology; the utility of diesel fuel and IC engines; and energy production method choices. It will finally seek to answer the fundamental question: "Off-highway vehicle powertrains: what is the best energy source?".

Hydraulic power for the digital age

Dr Niall Caldwell, managing director, Artemis Intelligent Power Ltd, UK

How can we enable automation, dramatically reduce fuel consumption and downsize the engines of off-highway vehicles – at a price the market can afford? Artemis has a radical answer: its Digital Displacement technology now enables hydraulics to compete with electric technology for efficiency and digital control. Both excavator and forklift application demonstrators have shown improvements of 20-40% over conventional systems, with potential for even more. Cooperating with Danfoss and local partner RFE, Artemis is now embarking on a major £22m project, supported by the UK Advanced Propulsion Centre, to bring the benefits of this technology to the off-highway market.

Panel Discussion

Bringing together the 'Electric & Hybrid' and 'Powertrain' audience to discuss 'Engineering challenges transitioning from traditional IC powertrains to electrification and hybridization'.

DAY 2 THURSDAY FEBRUARY 14

Poclain Hydraulics AddiDrive for heavy commercial vehicles

Bruno Lacheteau, director - truck and bus markets, Poclain Hydraulics, France

Since 2005, Poclain Hydraulics' heavy commercial vehicle offering has consistently evolved. Now available at many European manufacturers, more than 20,000 vehicles use AddiDrive, a hydraulic hybrid transmission that transfers torque to a non-mechanically powered axle only when needed. AddiDrive augments the efficiency and safety of trucks used in construction, forestry and municipal applications, while making them more economical and environmentally friendly. AddiDrive helps users who face last-mile traction problems to maximize uptime and payload. In addition to the technical solution, Poclain now offers co-marketing services to support a successful product launch and manufacturers' sales efforts.

Innovative new hydraulic motors

Dierk Peitsmeyer, product portfolio manager, Bucher Hydraulics, Germany

Hydraulic motors provide highest power density and very compact dimensions in comparison with electric motors. Hydraulic motors do not require an external cooling system, unlike e-motors. Today hydraulic motors are noisy, do not provide optimal efficiency, have torque pulsations at very low rpm and have problems starting under high load. To overcome these disadvantages, Bucher Hydraulics has developed new motors with innovative design: lowest torque ripple for smoothest rotation at low rpm, highest mechanical efficiency provides stick-slip free starts, highest total efficiency saves energy – and all this with low noise. New Bucher Hydraulics motors are very compact and offer new design options.

Development of a hydraulic hybrid transmission for heavy-duty vehicles

Norman Grant, director of engineering and technology, Miser Technologies - Ducere Holdings (Pty) Ltd, South Africa

This paper will outline the progress on a novel diesel-hydraulic hybrid for heavy trucks, which is being rolled out for selected clients. The system has 'regenerative braking' and 'engine optimization' abilities. The means to achieve these fuel-saving abilities will be explained in general terms from selected examples. The presentation will discuss selected projects and the results achieved to date. This will include the results from a controlled environment like the Gerotek test track in South Africa and the results achieved in pilot projects in the real world. There will be examples of the various layouts and configurations.

IC cooling systems – optimization

Tomasz Turek, R&D manager business unit Poland, segment leader electric vehicles, Enterex International, Poland

Even though currently the biggest new trend is electrification, there are still many applications where pure-electric solutions are not meeting requirements and it is imperative to use internal combustion engines with gearbox, or electric powertrain (hybrid solution). This situation, especially with increasing emission norms, challenges engineers to pay considerable attention to energy consumption and proper definition of requirements in order to minimize overdesign for a cooling system. Together with a more holistic approach for prototype testing and monitoring, we are able to define proper operation scenarios and optimize final solutions that not only ensure proper system cooling but also consume as little energy as possible.

Much lower emissions and costs for LPG-fueled range extenders

Rubens Basaglia, project manager, X-Tech R&P SA, Switzerland

The presentation discusses the development of close-to-zero-emissions variable-speed range extenders for electric/electrified vehicles, as well as heavy-duty and marine vehicles, utilizing an innovative liquid LPG common-rail injection system on Otto cycle gas engines. Such a solution realizes much simpler, smaller and cheaper power packs, due to the utilization of smaller three-way catalysts. It also meaningfully reduces maintenance costs and enables the use of a much less expensive and more abundant fuel such as LPG.

The dangers of aeration and how to test for it

Anthony Khoraych, president, Advanced Test & Automation, Canada

Aeration is deadly for engine components as air contamination in oil can cause thermal degradation to occur – ultimately causing varnish, sludge and carbon insolubles to form. Previously, the only way to test for aeration-induced failures was through hot engine (dyno) testing or in the vehicle. Understanding the aeration rate was a time-consuming and expensive endeavor. Now, new robust and accurate methods are available to measure the aeration rate under specific conditions and simulate the aeration rate to induce the failure modes caused by entrained and dissolved air in hydraulic fluids.

*This program may be subject to change

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INDUSTRIAL VEHICLE TECHNOLOGY

#ivtexpo

FEBRUARY 13-14, 2019
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Discover the next generation of industrial vehicle components, materials, concepts and manufacturing technologies

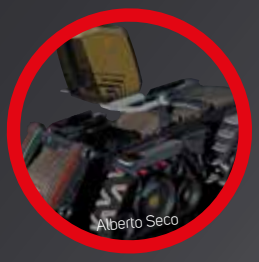
REDUCE EMISSIONS | INCREASE ELECTRIFICATION | IMPROVE OPERATOR SAFETY & COMFORT | BOOST VEHICLE AUTONOMY & EFFICIENCY

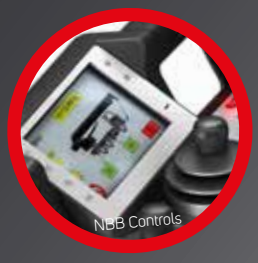
While you are in Cologne: From February 2019, the industrial vehicle industry will have an international exhibition that showcases nothing but the latest and next-generation components and technologies. The free-to-attend exhibition, which is closed to the public, will feature around 100 exhibitors, providing a compact, hassle-free environment tailor-made for serious discussion and business, without any of the logistics issues that go with very big events.

No full vehicles will be on show: **iVT Expo** will only showcase the components, services and technologies from Europe and all over the world that go into making the next generation of industrial vehicles, plus a range of manufacturing and assembly technologies.

iVT Expo will bring to life the pages of the market-leading Industrial Vehicle Technology International magazine. Visitors will discover new materials; new engine technologies, including electric motors and hybrid applications; new control systems that question the need for hydraulics; sensors; testing and validation services and technologies, from durability rigs to EMC and NDT technologies; cabin equipment; the technologies required for operatorless/driverless vehicles; and innovative ideas that will help manufacturers of industrial vehicles ultimately improve product design, efficiency and thus sales. The expo will also feature companies displaying the latest and next-generation manufacturing and assembly technologies for industrial vehicles.

Vehicle categories covered by **iVT Expo** are anything from off-road loaders, mining equipment and diggers, to tractors, cranes and lift-trucks. In short, technologies and services for every class of industrial vehicle will be on display.





FREE ENTRY INCLUDED WITH YOUR DELEGATE PASS!

YOUR DELEGATE PASS ALSO GIVES YOU ACCESS TO THREE PARALLEL CONFERENCES:

iVT Industrial Vehicle CAB DESIGN & TECHNOLOGY

A brand-new conference for 2019 entirely dedicated to next-generation cabin design and future technologies for industrial, commercial and off-highway vehicles.

iVT electric & hybrid industrial vehicle technology

The world's only conference exclusively dedicated to the design and development of electric and hybrid vehicle technology for the construction, agricultural, industrial and off-highway vehicle industry.

iVT AUTONOMOUS Industrial Vehicle Technology

Autonomous Industrial Vehicle Technology Conference is exclusively dedicated to the design and development of highly automated and unmanned construction, mining, agricultural, industrial and off-highway vehicles.

www.ivtexpo.com

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From the publisher of

iVT INTERNATIONAL INDUSTRIAL VEHICLE TECHNOLOGY

For more information about the Industrial Vehicle Powertrain Technology Conference, please contact
Nick Moller, conference director: nick.moller@ukimediaevents.com | Tel: +44 1306 743744

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