

electric & hybrid aerospace

TECHNOLOGY SYMPOSIUM

A futuristic white electric or hybrid aircraft is shown from a top-down perspective, flying over a city at sunset. The aircraft has a sleek, aerodynamic design with two large engines mounted on the wings. The city below is illuminated by the warm glow of the setting sun, with buildings and streets visible. The sky is filled with soft, golden clouds.

OCTOBER 30 & 31, 2024 | FRANKFURT, GERMANY

**CONFERENCE
PROGRAM**

**WHAT
TO SEE**

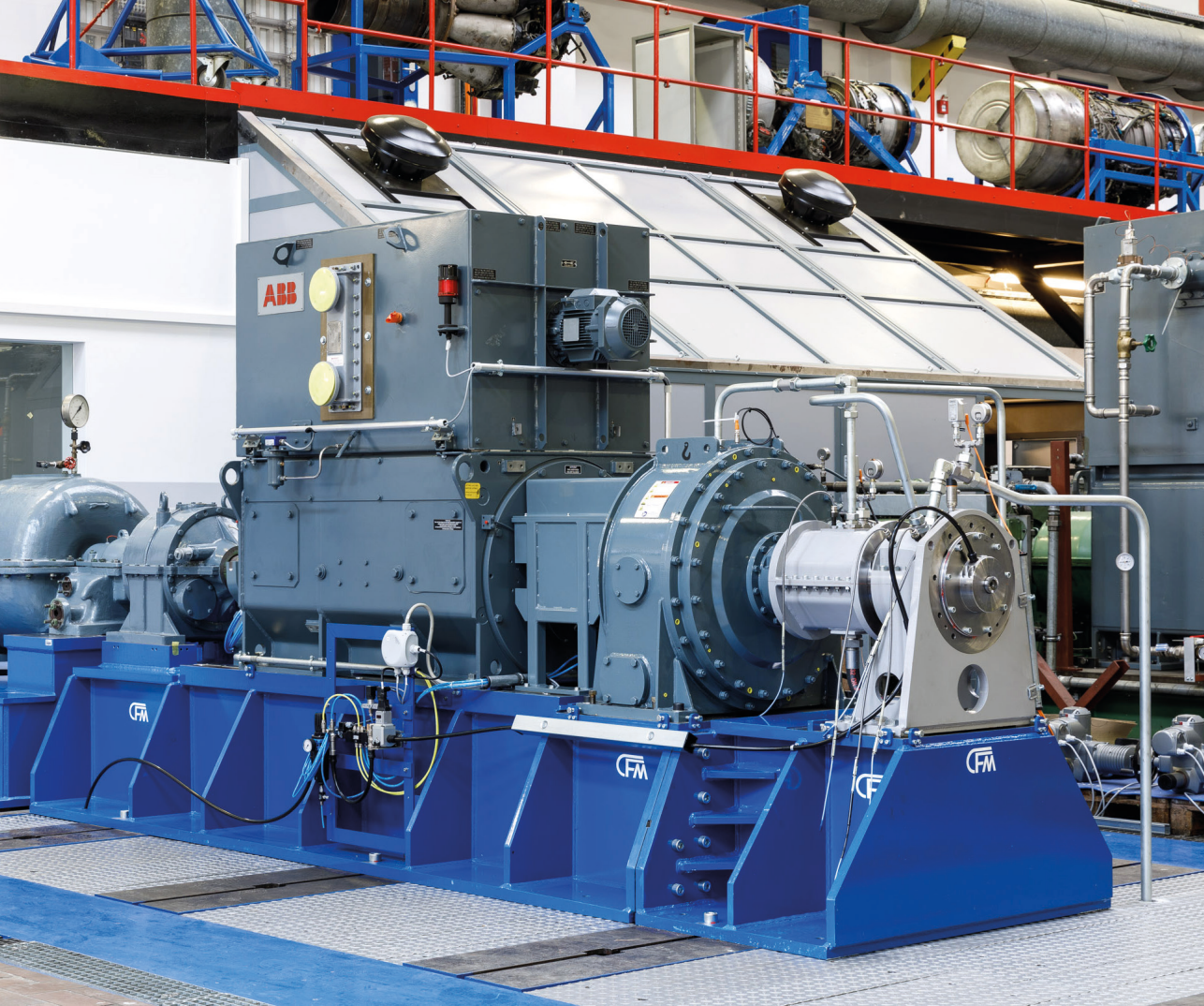
**USEFUL
INFORMATION**

**EXHIBITOR
LISTINGS**

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WELCOME TO ELECTRIC & HYBRID AEROSPACE TECHNOLOGY SYMPOSIUM



General manager
Richard de Courcy

Welcome to Frankfurt for the 2024 edition of Electric & Hybrid Aerospace Technology Symposium, the premier event focused on the advancement of electric and hybrid aerospace technologies. This year, over 50 experts will share insights on groundbreaking innovations in electric propulsion, hybrid powertrains, battery technology and sustainable aviation. Attendees will hear from industry leaders including Honeywell, EASA, Roland Berger and Pratt & Whitney, among others. On the show floor, discover innovative exhibitor solutions, all dedicated to propelling the aerospace industry toward a cleaner, more efficient future.

Our team is here to assist you throughout the event; the organizer's office is located just outside Harmonie Hall. We wish you all a productive and successful visit.

"The premier event focused on the advancement of electric and hybrid aerospace technologies"



THANKS TO OUR SPONSOR

Evoluto
The Power of Electric Flight

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Discover who you can meet and what's on show

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Evacuation procedures to be followed during an emergency

ORGANIZED BY

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Richard de Courcy,
exhibition general manager

Email: richard.decourcy@ukimediaevents.com

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ORGANIZER'S OFFICE

If you require assistance in finding your way around the exhibition, the organizer's office is located outside of Harmonie Hall



WI-FI

Wi-fi for browsing and checking emails is available FREE to all attendees:

Congress WiFi



SYMPOSIUM OPENING HOURS

WEDNESDAY, OCTOBER 30

09:00-17:00

THURSDAY, OCTOBER 31

09:00-15:00



DELEGATE DINING

Food and beverages (including a complementary lunch) are available on the show floor for all exhibitors and conference attendees

VISITOR CATERING

Book your catering and networking pass

Per day: EURO 50

Maximise your time at the symposium and engage with industry peers attending the conference, whilst enjoying the coffee and lunch break buffets on either show day.



ACCESSIBILITY

Electric & Hybrid Aerospace Technology Symposium can be accessed via the Frankfurt Congress Center, with all areas fully accessible via stairs and lifts. For any assistance, please contact the organizer's office, any member of the organizing team or Messe Frankfurt Congress Center staff

SOCIAL MEDIA

Seen something fantastic at the show that you want to share on your social feeds? Please mention Electric & Hybrid Aerospace Technology Symposium and use the event hashtag, and we'll be sure to like and share!



#EHATS | @EHAerospaceTech

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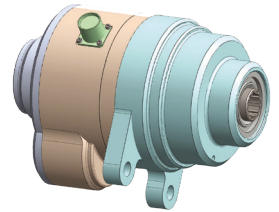
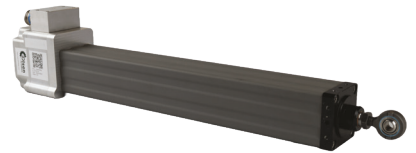


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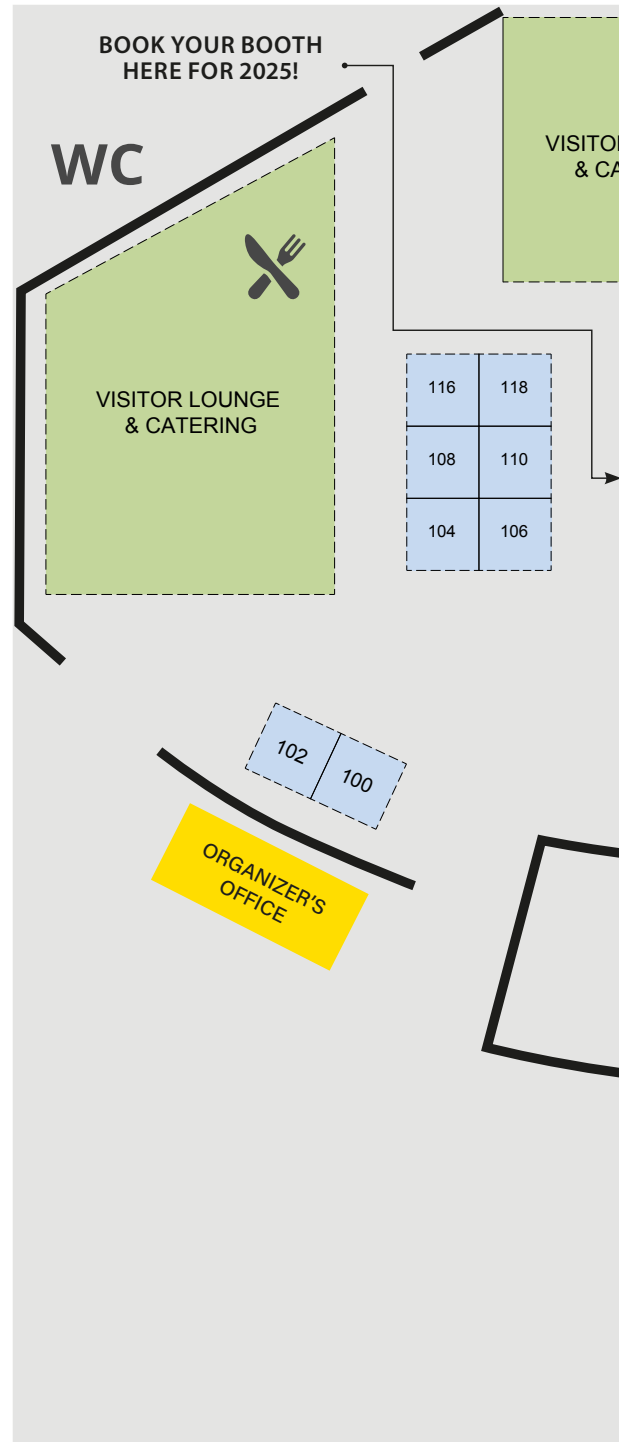
TECHNOLOGY SYMPOSIUM

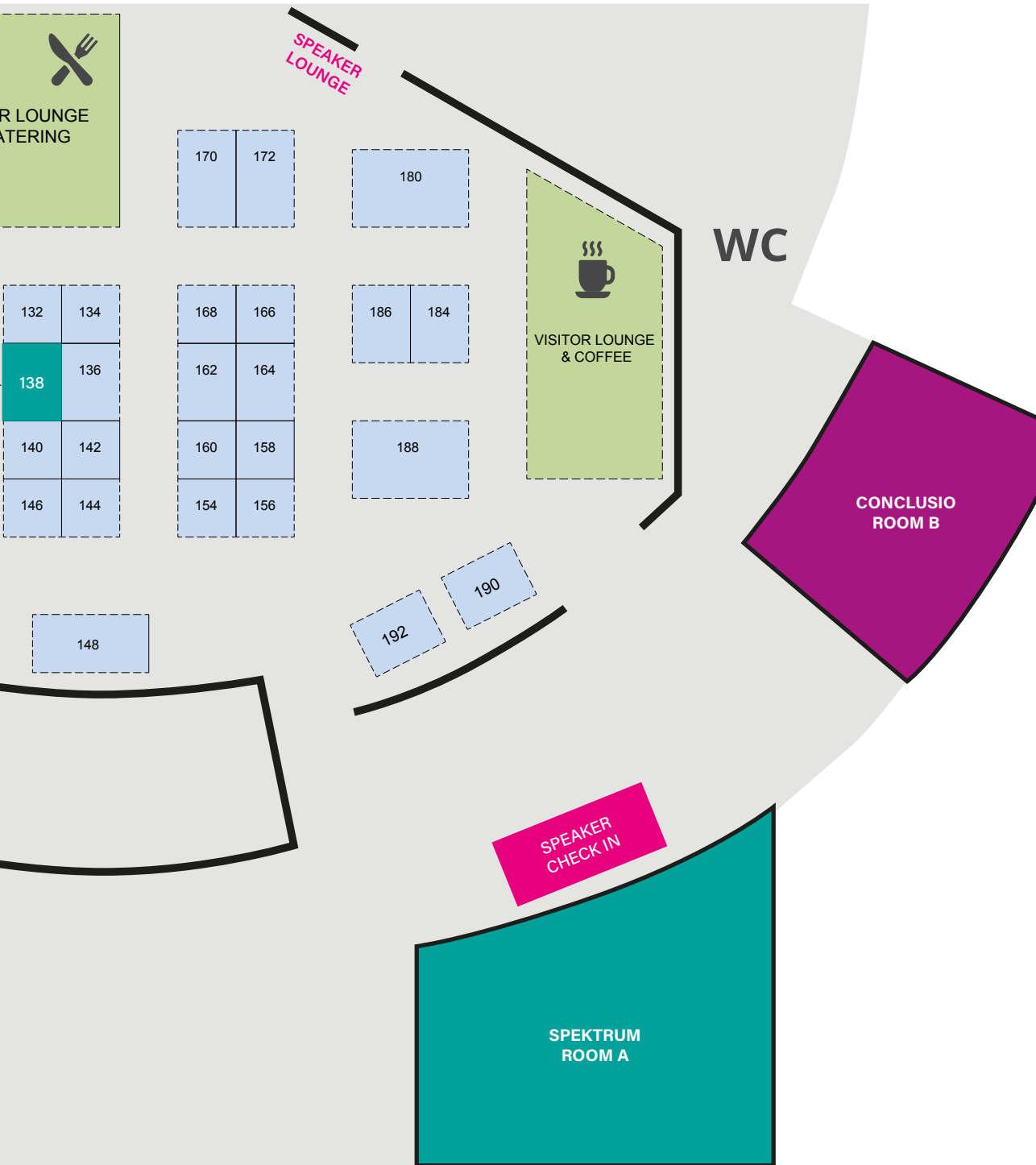
OCTOBER 30 & 31, 2024

MESSE FRANKFURT, GERMANY

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TECHNOLOGY SYMPOSIUM

OCTOBER 30 & 31, 2024, FRANKFURT, GERMANY

CONFERENCE PROGRAM

THE ROUTE TO ULTRA-LOW-EMISSION AIRCRAFT TECHNOLOGY AND FULL-ELECTRIC FLIGHT

ROOM A - SPEKTRUM

08:50 - 10:30 - Plenary keynote session
11:30 - 12:50 - Developing infrastructure for new aviation needs
14:00 - 17:00 - Path to net zero – decarbonizing aviation

DAY TWO

09:00 - 11:00 - Hydrogen and fuel cell technology
12:00 - 12:50 - Plenary panel discussion:
More electric aircraft
12:50 - 13:30 - Plenary closing remarks

ROOM B - CONCLUSIO

11:30 - 13:10 - Testing, validation, simulation, certification
and standardization
14:10 - 15:10 - Improving power density, weight and efficiency
15:55 - 17:00 - Progress and research in battery technologies/
energy carriers and powerplants

DAY TWO

09:00 - 11:00 - Latest developments for (e)VTOL and AAM



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DAY 1, WEDNESDAY, OCTOBER 30

08:50 - 10:30

Plenary keynote session - Room A

Moderator:**Dr Peter Malkin**, strategic research advisor, Newcastle University, UK

08:50

Guiding battery technologies for hybrid electric propulsion: a future outlook

Dr Amani Alhammadi, lead researcher, Technology Innovation Institute, United Arab Emirates

The shift toward hybrid electric propulsion (HEP) systems in aviation is primarily driven by advanced battery technologies with higher energy densities, enhanced safety features and improved charging capabilities. This research provides a comprehensive market analysis to identify current trends, challenges and opportunities in battery development for electric aircraft. Emerging technologies, such as solid-state batteries, are also highlighted for their potential to revolutionize the market. This study aims to align research efforts with industry needs, contributing to the advancements in battery technology critical to supporting HEP and paving the way for a more sustainable future in aviation.

09:10

UK CAA Hydrogen Challenge

Helen Leadbetter, zero-emissions flight and Hydrogen Challenge lead, UK Civil Aviation Authority, UK

The presentation will comprise an introduction to the UK CAA Hydrogen Challenge, its aims and objectives, gap analysis for certification specifications, sandbox activities and working groups.

09:30

A propeller for the 21st century**Andrew Leonards**, business development strategy director, Dowty, a GE Aerospace company, UK

Propellers continue to be the most appropriate means to generate thrust for aircraft powerplants on a wide range of sustainable regional and subregional configurations. This session will explore what is important in propeller system design and construction, and how the evolving needs of the industry, particularly around more sustainable powerplant options, can be met with new digital technologies and capabilities.

09:50

Charging is not enough - the importance of energy transition

Laura Leoncini, senior business development, e-aviation, Eaton, Switzerland

The aviation sector is undergoing a tremendous change, driven by the need for decarbonized air mobility. Electric propulsion changes the paradigm not only in the air but on

the ground. While traditional OEMs were making planes, counting on the availability of fuel, today's need for charging an aircraft brings a serious topic to the table, and the electrification of airports and vertiports means a total shift in energy transition, from the source of energy all the way to its management and final delivery.

10:10

European hybrid and electric aviation research within Horizon Europe

Dr Michael Kyriakopoulos, senior expert, EU aviation research policy, European Commission, Belgium

Horizon Europe is a €100bn EU framework program for research and innovation for the period 2021-2027. It aims to build a knowledge- and innovation-driven society and competitive economy and additionally contribute to sustainable development in the important high-tech aviation sector. Europe's aviation sector continues its resilient and pioneering spirit as it leads the world's transportation system into its new era of great transformation. The presentation will provide a holistic view of past, present and future research and innovation activities in the area of hybrid and electric aviation. It will also address relevant Horizon Europe programs, their results and the funding opportunities that have synergies with and impact on aviation research.

10:30 - 11:30

Break

11:30 - 12:50

Developing infrastructure for new aviation needs - Room A

Moderator**Adrian Sauer**, scientific researcher, Fraunhofer IISB, Germany

11:30

Manufacturer, operator and airport. Together toward an integrated system change

Florian Kruse, founder and CEO, Evia Aero GmbH, Germany

We need to rethink aviation, integrated and with our own energy ecosystems. Evia Aero strives to be the first airline in Europe to operate zero-emission aircraft on a fixed, commercial schedule. Operations are scheduled to start in late 2026/early 2027 with a 9-seat hydrogen electric aircraft (H₂-converted Britten-Norman Islander) followed by a 9-seat battery electric aircraft (Eviation Alice) in 2029. Evia Aero is one of the aviation companies in Europe that has signed LOIs for 25 electric aircraft (manufacturer Eviation, USA) and 25 hydrogen hybrid aircraft (manufacturer Cranfield Aerospace Solutions, UK).

11:45

Sensitivity analysis on route economics of electric flights

Niek van Amstel, airport planner, NACO, Netherlands

Per airport, the potential of e-flight could be investigated based on the current and future demand and route network. Furthermore, the additional charging and electrical infrastructure could also be quantified based on earlier research. This case study based on a Latin-American market combines these two initial steps and continues with an analysis of the route economics. With this third step, new insights have been gained into which factors have a significant influence on the economic viability of e-flight. Consequently, it shows the year in which e-flight would show lower operating costs than conventional flights.

12:00

Multi-input multi-output energy model for future airports

Dr Andrew McGordon, reader, WMG, University of Warwick, UK

The presentation offers a scalable airport system-level energy model developed to represent the electrification of the ground support equipment (GSE) fleet of a regional airport, combined with the electrification of short-range flights. The model is capable of calculating and visualizing the airport electrical loads from future electric ground support equipment (eGSE) in combination with the electrification of short-range flights scheduled from the airport. The work has generated the requirements for future electric loads at an airport and the effect on the electrical grid infrastructure which needs to be in place to support this future electrification and decarbonization opportunity.

12:15

Greening regional airports: a vision for energy demand, operational strategies

Markus Meindl, researcher, Fraunhofer Institute for Integrated Systems and Device Technology (IISB), Germany

This presentation shows potential scenarios for the infrastructure expansion of a regional airport during the transition to the electrification of aviation. With a real-time simulation model, accurate data from two regional partner airports and hybrid electric aircraft designs of a 50-pax regional aircraft class, realistic statements can be made on a development trend for airports. In particular, the potential expansion of the electrical infrastructure through PVs, wind farms and on-ground battery storage systems is analyzed. The simulation can show the energy requirements and which operating strategies could be of interest to airport operations in the future.

12:30 - 14:00

Lunch

14:00 - 17:00

Path to net zero – decarbonizing aviation - Room A

Moderator

Adrian Sauer, scientific researcher, Fraunhofer IISB, Germany

14:00

Adaptability of hybrid systems for platform requirements

Zubair Baig, senior technical fellow, electrification, Pratt & Whitney, USA

The strength of hybrid systems is their ability to adapt the system architecture to meet specific platform needs. P&W, along with its RTX partners, is developing the key building blocks to meet the needs of over 100 unique platform requirements. Learn about how P&W is doing this and the challenges it is tackling along the way.

14:15

Overview of clean aviation projects and deep-dive HeDrive project

Christian Bentheimer, group leader, aviation electronics, Fraunhofer-IISB, Germany

The presentation will offer an overview of clean aviation projects with Fraunhofer IISB participation. Project Newborn focuses on the development and demonstration of the TRL 4 ground demonstrator of a complete propulsion system using 1MW fuel cell modules for electricity generation. Project Amber research efforts will lead to tests of a ground-mounted rig that combines a megawatt-class electric motor driven by hydrogen fuel cells. Project HyPoTraDE will design, assemble and ground-test a set of 500kW modular fuel cell battery hybrid electric DEP powertrain architectures. Finally, the HeDrive project offers a presentation of the demonstrator of a fail-redundant 700kW electric helicopter propulsion system.

14:30

Design of electrical propulsion systems for safety and certification

Dr Peter Malkin, strategic research advisor, Newcastle University, UK

The safety of electrical propulsion systems for aircraft is achieved by a totally different route from conventional aircraft. It is essential that safe design is designed-in from the beginning as adapting the design afterward simply will not work. The paper describes the design principles used on the GKN-led H2GEAR program and how these are being demonstrated to certification authorities. This consists of a radical design approach using advanced protection systems that can be shown to give a system that is as least as robust as that used in conventional large aircraft. The presentation will detail this design and the results obtained.

14:45 - 15:45

Break

15:45

Facilitating the future of ultra-efficient aviation

Dr Sam Lee, senior technologist, propulsion, Aerospace Technology Institute, UK

The ATI has published the *UK Aerospace Technology Strategy, Destination Zero* and continues to support technology development in the UK to make this vision a reality. Part of this future vision includes more electric and hybrid aircraft. This presentation will provide an update on some of the key ATI-funded projects that are making ultra-efficient and zero-carbon aviation a reality. Additionally, a summary of the technology bricks that ATI has identified as the key drivers toward hybridization in aviation will be shared and discussed.

16:00

Hybrid electric engine flight test demo program

Dominique Belisle, aerostructure chief designer, hybrid electric engine flight test demo program, Pratt & Whitney Canada, Canada

General overview of the HEP engine and propulsion system configuration, aircraft modifications and program objectives. Hybrid electric program high-level description, technology used for the demonstrator flight, and flight test vehicle modifications to install the hybrid electric system.

16:15

Proven automotive-based solutions as enablers for sustainable, safe and secure aerospace

Christian Grim, general manager, Bosch General Aviation Technology GmbH, Austria

Zero-emission mobility as a common goal across industry – whether on the road, in the air or in space – motivates us to develop advanced automotive-based solutions for the future of mobility. In the area of propulsion, the presentation focuses on the impact of advanced powertrain technologies (hybrid, hydrogen, electric) in the mobility future. Beyond the powertrain-proven industry solutions from components, technologies and engineering, the presentation will share Bosch’s experience and expertise of security and safety-related products and services for aerospace. Bosch believes that it is key to utilize synergies across industries to speed up and enable the technological transition.

16:30

Which is the most effective technology to decarbonize aviation: SAF, hydrogen or DACCS?

Siyi Hao, project manager, Roland Berger Ltd, UK
Dr Daniël Kan, sustainability specialist, Royal NLR – Netherlands Aerospace Centre, Netherlands

Several technologies have the potential to decarbonize aviation – sustainable aviation fuel (SAF), hydrogen, or even direct air capture with carbon storage (DACCS). However, this is not a straightforward choice: SAF faces challenges in affordability and scaling up, hydrogen requires significant

changes to aircraft technologies and infrastructure, whilst DACCS is an out-of-sector solution that still relies on fossil fuels. Roland Berger and NLR team up to assess this problem holistically by analyzing the ecosystem economics and environmental lifecycle impacts of these technologies.

11:30 - 13:10

Testing, validation, simulation, certification and standardization - Room B

Moderator

Cristian Anghel, senior fellow, Honeywell Aerospace Technologies, USA

11:30

Propulsion batteries

Carlos Javier Munoz Garcia, new electrical technologies expert, European Aviation Safety Agency, Germany

Certification of propulsion batteries and high-voltage systems.

11:45

Electrified aircraft entry into service acceleration

Dr Evgeni Ganey, CEO, EMPS Consulting LLC, USA

Targeted entry into service (EIS) for different classes of vehicles will be projected along with the performance requirements needed to be achieved. Various obstacles for a speedy EIS will be analyzed. Based on the latest technical achievements, methodologies will be presented for rapid acceleration. Faster TRL progress, analysis, design, testing, fabrication, certification and infrastructure will be proposed. New tools using artificial intelligence and machine learning will be introduced. Autonomous vehicle function will be addressed as a provision for time saving. Hardware-in-the-loop will be discussed, as well as conclusions and recommendations for a faster EIS.

12:00

Efficient monitoring of software quality and standard compliance

Dr Flavien Huynh, senior business development engineer, Vector Informatik, France

Aerospace projects imply multiple layers, objects and relationships. Their combined content and interconnections generate a ramping complexity as the project grows, requiring increasing assessment and reporting capacities. The presentation will discuss how a continuous monitoring solution following the project lifecycle can help track software quality and standard compliance at the global level as well as applying full traceability analysis to focus on individual objects needing attention.

12:15

Electric and hybrid aerospace propulsion systems testing

Prof Chris Gerada, professor of electrical machines, University of Nottingham, UK

This presentation will provide an overview of the infrastructure and test processes needed to develop, characterize, and qualify electric propulsion systems for flight. It will first review test requirements needed as part of the development process and specific facilities required. It will then cover subsystem and system test requirements including fault insertion. A detailed overview of the investments at the University of Nottingham's National Electrification Propulsion Facility will be given, including the recent developments in a MW-class cryogenic powertrain testing facility. The presentation will also cover digital twins for HIL tests and present case studies.

12:30

NLR's liquid hydrogen testing facilities for the CH COCOLIH2T project

Rens Ubels, principal project engineer, Royal NLR – Netherlands Aerospace Centre, Netherlands
NLR will give an overview of its activities in the EU Clean Hydrogen project COCOLIH2T. Under this project, NLR and its partners are developing, manufacturing and testing a composite liquid hydrogen tank for aerospace applications.

Besides an overview of the project and NLR's activities, the focus will be on cryogenic testing capabilities and in situ liquid hydrogen testing capabilities at NLR. Within COCOLIH2T, NLR generates material properties at 20K, performs permeability tests and will test full-scale liquid hydrogen tanks in the newly developed outdoor test facility. Large amounts of liquid hydrogen are available to test containers, fuel cells and jet engines.

12:45 - 14:10

Lunch

14:10 - 15:10

Improving power density, weight and efficiency - Room B

Moderator

Roel van Benthem, senior R&D engineer, energy management/hydrogen systems, Royal Netherlands Aerospace Centre, Netherlands

14:10

Optimization of liquid-bearing cooling systems to enable scalable mass production

Patric Mairhofer, head of innovation management, Henn Connector Group, Austria
The presentation explores the optimization of cooling systems for electric aircraft, focusing on scalable designs for mass production. Drawing from automotive industry

experiences, it emphasizes the importance of integrating tolerance requirements, space constraints and flow optimization from the outset. Special attention is given to the fluid management system, particularly the coupling mechanisms for pipes and hoses. By leveraging proven automotive strategies, transitioning from prototype to mass production is seamless, efficient and cost-effective. Henn's approach guarantees that aircraft liquid cooling systems are robust, adaptable and ready for widespread adoption.

14:25

14:25 - Fokker Next Gen - Clean sheet hydrogen combustion aircraft

Ron van Baaren, chief technology officer, Fokker Next Gen and CEO of ADSE

Consulting and Engineering, Netherlands

Fokker Next Gen has the ambition to enable net-zero aviation by developing a clean sheet hydrogen combustion airliner for 120 passengers, aimed at an entry into service in 2035. This presentation elaborates upon the aircraft design, with specific focus on the key technological challenges related to the liquid hydrogen storage and distribution system and the hydrogen combustion engine and associated R&D activities.

14:40

Selecting optimum voltages for high-power electric machines for hybrid and electric aerospace

Cristian Anghel, senior fellow, Honeywell Aerospace Technologies, USA

Recently, electric motors and generators rated from 200kW to 1MW with DC voltages ranging from 500V DC to 4,000V DC have become one of the key technologies supporting the goals of hybrid electric propulsion, such as driving overall system efficiencies as high as possible while reducing system weight by increasing the power density and system simplicity. This presentation compares the advantages and disadvantages of different high-voltage DC levels used in electric generators and motors and distribution equipment. Honeywell has an unparalleled generator and motor range for aerospace, based on more than 100 years of innovation and product development, ranging from hundreds of watts to 1MW.

14:55

Additive manufacturing of 3D magnetic circuits

Dr Alexander Goodall, lecturer, University of Edinburgh, UK

Additive manufacturing has been revolutionary in enabling complex structural components, however, the utilization of functional materials such as soft-magnetic materials is relatively immature. 3D magnetic circuits in electrical machines have been elusive due to the high eddy current losses caused by thick cross-sections in bulk material, and the inability to process electrical steel laminations into 3D structures. By processing soft magnetic materials with additive manufacturing, geometry can be tailored to

avoid thick cross-sections and reduce eddy currents whilst maintaining a 3D magnetic circuit, enabling new machine architectures that can meet the power density targets for the electrification of aviation.

15:10 - 15:55

Break

15:55 - 17:00

Progress and research in battery technologies/energy carriers and powerplants - Room B

Moderator

Herdrice Hereson, section manager, general aviation and VTOL propulsion and powerplant systems, EASA, Germany

15:55

Why not all lithium-ion technologies are created equal

Geraud Vatin, program manager, Saft, USA
Technology selection must evaluate applications and qualifying standard requirements including but not limited to electrical performance, mechanical integration and environmental use. The industry lessons learned are incremental and based on countless tests, validations and return of experiences. The novel AAM market eVTOL offers new opportunities but also many challenges we must be willing to assess, evaluate and learn from. Aviation-grade lithium-ion technologies to power the AAM EVTOL offer new opportunities but additionally many challenges. This presentation reviews a few of these challenges by comparing the latest developments and lessons learned from lithium-ion technologies.

16:10

Contrasting the capabilities of hybrid and battery electric aircraft

Eric Bartsch, CEO, VerdeGo Aero, USA
Electrification will only make a sustainability impact for aviation if it can deliver useful mission capabilities that replace existing aircraft. VerdeGo has applied experimental data from its hybrid powerplants to model the performance of electrified aircraft with both hybrid and battery powertrains. The results of this work show a compelling case for hybridization being the propulsion architecture that will have the biggest impact on the most use cases as electrification becomes mainstream. While the automotive industry evolved from hybrids to battery power, aviation is moving in the other direction from batteries in R&D aircraft to hybrids in production use cases.

16:25

Battery electric aircraft: the roadmap to certification and safety

Dr Sebastian Seemann, CTO and co-founder, Vaeridion GmbH, Germany

This session will explore the benefits of a battery electric aircraft for the regional air mobility market. Attendees will gain a better understanding of how the novel propulsion technologies used by such aircraft will affect not just aircraft design, but also the airport infrastructure and operations. The session will also focus on certification and the role of regulators in achieving zero-emission targets.

16:40

Hardware-in-the-loop testing for battery management and aircraft controller

Yves Gerster, aerospace industry manager, Speedgoat, Switzerland

Explore next-generation aerospace design and testing workflows. Understand how hardware-in-the-loop testing, using real-time cell emulation, expedites the testing and certification of your battery management system (BMS). The presentation will cover examples of automated BMS and controller testing and provide an overview of tools and methodologies that streamline the design verification phase. Delve deeper into certification and powertrain development using Simulink Real-Time and Speedgoat real-time target machines.

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DAY 2, THURSDAY, OCTOBER 31

09:00 - 11:00 -

**Hydrogen and fuel cell technology
- Room A**

Moderator

Dr Christoph Gentner, scientist, Deutsches Zentrum für Luft- und Raumfahrt (DLR), Germany

09:00

Flying Hy – enabling zero-carbon flight

Matthew Swift, product development lead for hydrogen heat exchangers, Reaction Engines, UK
This segment will explore where Reaction Engines is applying its novel thermal management technologies to tackle the issues around hydrogen-fueled flight. Building on the shoulders of decades of cutting-edge development in the space sector, this expertise is now driving the next generation of green transportation, aiming to offer system-level efficiency gains while ensuring safety, reliability and repeatability. Participating in a number of funded programs, this presentation will also provide a window into those activities and outline where this funding is creating value.

09:15

PowerCell’s fuel cell enabling hydrogen electric flights

Dr Andreas Bodén, SVP and CTO, PowerCell Group, Sweden

Do you want to know how fuel cells can help decarbonize the aviation sector? Learn how it is possible to cover almost all of Sweden’s flights with hydrogen electric fuel cell aircraft. The world’s first commercial hydrogen electric airplane flight utilized a PowerCell 100kW fuel cell system, marking the start of the company’s journey in aviation. PowerCell Group is now a world leader in hydrogen fuel cell technology for aviation, with over 20 ongoing projects for fixed wing, e-VTOL and more, continuing the groundbreaking development of next-generation aviation fuel cells.

09:30

Hybrid electric propulsion systems test aircraft (HEPSTA)

Dr Rukshan Navaratne, reader in power and propulsion, Cardiff University, UK

Fuel cell systems provide a zero-emission solution for aircraft propulsion. To assure safe and reliable fuel cell operation in aircraft, system testing has to be conducted under realistic operating conditions. Therefore the HEPSTA has been developed as a flying testbed to provide a system carrier for time- and cost-effective airborne fuel cell system testing. In this keynote presentation the test platform HEPSTA will be described with the new fuel cell system generation and latest

results, comprising laboratory measurements and insights on the system design, especially focusing on the concept of hybridization for power optimization and system reliability.

09:45

CA HyPoTraDe: preparations for a liquid hydrogen fuel cell powertrain ground test (500kW) at NLR

Roel van Benthem, senior R&D engineer, energy management/hydrogen systems, Royal Netherlands Aerospace Centre, Netherlands
In the frame of the clean aviation project HyPoTraDe, NLR in the Netherlands is preparing a new test facility for ground tests of liquid hydrogen-powered fuel cell powertrains. The presentation shows the preparation of the powertrain hardware involving two 100kW fuel cells, two large batteries, electrical power distribution and five propulsor units including the innovative use of a two-phase transfer loop for collecting fuel cell waste heat for the conditioning of liquid hydrogen.

10:00

Balance of plant design for aerospace fuel cells

Liam Reddy, simulation engineer, Aurata Technologies, UK

Hydrogen fuel cell technology is most cost-effectively available for low-volume niche aerospace applications as an off-the-shelf system. It contains the air, hydrogen and thermal systems (balance of plant), not optimized for the application. This presentation will outline an optimized systematic approach to allow bespoke balance of plant systems to be developed for low-volume aerospace at reduced effort and cost. This can result in performance uplifts/cost reduction, such as increased power density, critical for increasing the viability of the overall fuel cell systems, helping accelerate the transition to zero-carbon fuels for niche applications.

10:15

Enhancing PEM fuel cell system performance via alternative component integration

Dr Christoph Gentner, scientist, Deutsches Zentrum für Luft- und Raumfahrt (DLR), Germany
PEM fuel cell systems play a pivotal role in realizing the aviation industry’s net zero goals. Currently, PEM fuel cell systems exhibit a gravimetric power index of approximately 1kW/kg. At the system level, stacks, electric motors and humidifiers are particularly responsible for this low index. The presentation will outline the anticipated changes in system performance (efficiency, gravimetric index, aircraft resistance) compared to a baseline system. Conventional components and subsystems will be replaced with alternative variants. This will provide an estimation of how the integration of unconventional components and subsystems could enhance the performance of PEM fuel cell systems in aviation.

10:30

Challenges in fuel cell testing for aircraft

Javier Gutierrez, principal business development manager, NI, now part of Emerson, Spain

The goals to decarbonize the aerospace industries are quite formidable. When looking for ways to electrify aircraft, developing fuel cell technologies are being looked at to provide energy to the different systems, but this will require a very aggressive R&D and validation process. This presentation will look into some of the challenges based on real examples and how they have been resolved.

10:45 - 12:00

Break

09:00 - 11:00

Latest developments for (e)VTOL and AAM - Room B

Moderator

Herdrice Hereson, section manager, general aviation and VTOL propulsion and powerplant systems, EASA, Germany

09:00

The electric cabin: designing zero-emission aircraft interiors

Dr José Rui Marcelino, CEO, Almadesign, Lda, Portugal

The increase in urbanization and road congestion has raised the need to address new solutions for transportation. Urban air mobility has come up as a possible solution, supported by the advance of sustainable propulsion, energy storage systems, connectivity, automation and lightweight structures. The FLY.PT project, involving Portuguese aerospace companies, explores autonomous electric mobility combining a drone, a passenger cabin and a skateboard, for vertical and horizontal movement. The collaborative design methodology included the creation of a morphological table to support the generative phase, sketching sessions to visualize concepts and a concept selection matrix to choose and refine concepts collaboratively.

09:15

A model-based approach to eVTOL development

Steve Caravella, solutions architect and market development manager, integrated electrical systems (IES), Siemens, USA

With over 300 companies delving into eVTOL aircraft development, obstacles loom large. These vehicles aren't mere electric helicopters; they're finely tuned for electrical propulsion, demanding novel approaches. Foremost among these is adopting cutting-edge technologies for safe

flight. This adds to the already complex electrical systems landscape in an industry transitioning to electric aircraft. Yet, taking off is just the beginning. Meeting regulatory standards, completing flight testing and ramping up production while ensuring economic viability are essential. Traditional methods prove slow and risky in this age of digitalization. A model-based approach, leveraging digital processes is emerging as a necessity for eVTOL success.

09:30

EHPS

Alberto Molina, electric/hybrid propulsion systems and VTOL expert, EASA, Germany
EASA roadmap on electric/hybrid propulsion systems.

09:45

Electrohydrodynamic propulsion

William Tahil, research director, Meridian International Research, France

Electrohydrodynamics (EHD) came to attention in 2018 when MIT flew an aircraft propelled by ionic wind. When high voltage is applied between two electrodes, the ion discharge between the electrodes entrains air molecules creating airflow. The airflow is then directed to generate lift and thrust. Researchers have obtained thrust to power ratios of 7-100N per kW from ionic wind thrusters, comparable to light helicopters. Ionic wind propulsion could power the ultimate electric aircraft using electricity directly to create thrust. Its advantages for an eVTOL would include silent operation and the elimination of rotors, with fully distributed propulsion.

10:00

Accelerating the adoption of electric propulsion

Connel Williams, head of controller engineering, Evolito, UK

In the dynamic landscape of aerospace engineering, three critical themes emerge for the success of electric and hybrid flight: axial flux motors, type certification and propulsion efficiency. This presentation delves into their interplay and implications.

Axial flux motors for aerospace: these cutting-edge motors are at the forefront of aerospace innovation. By leveraging their compact design and high-power density, Evolito enhances overall propulsion efficiency. The exploration of axial flux motors promises breakthroughs in weight reduction, performance optimization and integrated redundancy.

The role of type certification in electric propulsion: as electric and hybrid propulsion systems gain prominence, understanding their certification process becomes paramount. The presentation sheds light on the pivotal role of type certification in shaping the future of electric propulsion.

Regulatory compliance, safety standards and scalability are key considerations. Reshaping airframe capabilities: propulsion efficiency directly impacts airframe design. By achieving greater energy conversion and minimizing losses,

engineers can reimagine aircraft mission profiles, efficiency and performance.

In summary, this exploration bridges technological boundaries, emphasizing the need for collaboration between motor design, certification regulations and airframe engineers. The future of aerospace hinges on these synergies, propelling us toward more sustainable, efficient and agile flight solutions.

10:15

Navigating sustainable mobility: beyond cars and into the skies

Simon Rudolph, co-founder and head of projects, EFT Mobility AG, Germany

Explore the future of sustainable transportation beyond traditional automobiles at this presentation which will delve into innovative alternatives for the aviation industry. It will uncover how cutting-edge propulsion technologies like electric, hybrid and hydrogen-powered aircraft are revolutionizing air travel while reducing environmental impact. Discover how EFT Mobility is envisioning a greener, more efficient future. Engage in discussions on the transition process and the collaborative efforts needed to propel sustainable mobility forward.

10:30

Autonomy for eVTOL/AAM parapublic missions - first-person flight perspective

Johnny Doo, president, International Vehicle Research, Inc., USA

Rapid advancement of electric vertical take-off and landing (eVTOL) and advanced air mobility (AAM) technologies presents groundbreaking opportunities for parapublic missions. This presentation explores the pivotal role of autonomy in eVTOL/AAM systems, particularly in the context of public service operations. Leveraging firsthand flight experiences, the speaker offers a unique perspective on how autonomy can transform parapublic eVTOL operations. By identifying the practical means to allow first responders, firefighters, EMS technicians and military service members to operate eVTOL aircraft safely and effectively, the presentation addresses the evolving challenges and opportunities inherent in the operation and training requirements of autonomous eVTOL aircraft.

10:45 - 12:00

Break

12:00 - 12:50

Plenary panel discussion: More electric aircraft - Room A

12:00

Panel discussion

Moderator

Prof. Tao Young, professor of aerospace electrical systems power electronics, machines and control group, Institute of Aerospace Technology, Na1

Christian Grim, general manager, Bosch

General Aviation Technology GmbH, Austria

Connel Williams, head of controller engineering, Evolito, UK

Piers Olsen, CEO, Olsen Actuators & Drives, UK

12:50 - 13:30

Plenary closing remarks - Room A

12:50

Panel discussion

Adrian Sauer, scientific researcher, Fraunhofer IISB, Germany

Dr Christoph Gentner, scientist, Deutsches Zentrum für Luft- und Raumfahrt (DLR), Germany

Cristian Anghel, senior fellow, Honeywell Aerospace Technologies, USA

Herdric Hereson, section manager, general aviation and VTOL propulsion and powerplant systems, EASA, Germany

Dr Peter Malkin, strategic research advisor, Newcastle University, UK

Roel van Benthem, senior R&D engineer, energy management/hydrogen systems, Royal Netherlands Aerospace Centre, Netherlands

13:30 - 15:00

Exhibitor Networking Lunch

Join us for the Exhibitor Networking Lunch, a unique opportunity to connect with key industry professionals. This offers a relaxed setting to schedule one-on-one meetings between delegates and exhibitors, fostering meaningful conversations and potential partnerships. Whether you're looking to showcase your products, explore new business opportunities, or strengthen existing relationships, this lunch provides the perfect platform. Attendees can engage in informal discussions, exchange ideas, and arrange future meetings while enjoying a delicious meal. Don't miss this chance to expand your network and make valuable connections that can drive your business forward.

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Boeli Group**Booth: 168****Web:** www.boeli.com**Bosch General Aviation Technology GmbH****Booth: 180****Web:** www.bosch-aviation.com

Bosch Aviation Technology is an enabler for sustainable aviation by transferring automotive products, technologies and engineering services to the aviation and space industries. Bosch Aviation Technology is keen to deep dive into the established Bosch mobility portfolio to find the perfect solution for your needs. Please contact www.bosch-aviation.com or visit the booth.

Carpenter Technology Corporation**Booth: 190****Web:** www.carpentertechnology.com

Carpenter Electrification is a leader in high-performance soft magnetic alloys, serving various industries, including aerospace. Its innovative materials enhance energy efficiency, reduce weight and optimize the performance of electric and hybrid systems. With decades of expertise, Carpenter Electrification is committed to advancing sustainable technologies across multiple sectors.

CMD Costruzioni Motori Diesel SpA**Booth: 110****Web:** www.cmdengine.com

CMD is an Italian company focused on IC engines' design and production and related FADEC under EASA DOA. CMD produces engines under EASA POA and is involved in the machining market field. The company is looking at the future market, focusing on hybrid systems, fuel cells, batteries, electric motors, etc.

Drive System Design Ltd**Booth: 192****Web:** www.drivesystemdesign.com

Drive System Design is an award-winning engineering consultancy specializing in the rapid engineering and development of electrified propulsion systems and associated technologies. The company works collaboratively with aerospace, defense, off-highway, automotive and commercial vehicle OEMs, Tier 1s and research bodies through its technical centers in the UK and North America.

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dSPACE is a leading provider of simulation and validation solutions worldwide for developing autonomous and electrically powered vehicles. For more information visit www.dspace.com.

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EN4 specializes in advanced testing solutions for a wide range of systems, from electric components to cutting-edge eVTOL aircraft. With extensive expertise, EN4 designs and implements test environments that ensure precision, safety and compliance. The company's collaborative approach and deep industry knowledge make EN4 a trusted partner in innovative technology development.

Fraunhofer-Institut für Integrierte Systeme und Baelementetechnologie IISB**Booth: 186****Web:** www.iisb.fraunhofer.de

The Fraunhofer IISB in Erlangen, Germany, specializes in wide-bandgap semiconductors and efficient power electronics. Here, material and device know-how merges with complex system development, especially for e-mobility and sustainable energy supply.

Gantner Instruments**Booth: 142****Web:** www.gantner-instruments.com

Gantner Instruments, founded in 1982, is a global leader in precision measurement solutions. Renowned for innovative data acquisition systems, the company serves the electrification, mobility and aerospace sectors. With offices worldwide, Gantner's cutting-edge technology excels in high-voltage measurements, battery testing and power analysis.

German Aerospace Center (DLR), Institute of Engineering Thermodynamics

Booth: 146

Web: www.dlr.de/tt

Germany's National Aerospace Research Center (DLR) focuses on sustainable propulsion technologies, such as hydrogen fuel cells. It performs analyses on the system level using its in-house Airfox sizing tool, and conducts experiments with setups like BALIS, which enables MW-level component testing.

Glenair GmbH

Booth: 156

Web: www.glenair.de

Glenair is a leading manufacturer of advanced interconnect technologies. The company is MIL-Spec certified and additionally offers commercial round and rectangular connectors. All interconnect designs are available in ambient, filter, hermetic and fiber-optic configurations. Interconnect technologies can be supplied either as individual components or integrated into turnkey assemblies.

Henn GmbH & Co. KG

Booth: 136

Web: www.henn.at

Henn uses its long experience in the automotive industry to bring new ideas to aerospace technology. The company specializes in quick couplings and connectors for electric and hybrid systems. Its products are reliable and efficient, helping to improve modern aerospace applications and support a sustainable future.

Hofmann Mess- und Auswuchttechnik

Booth: 108

Web: www.hofmann-global.com

Hofmann and HP Consulting are at the expo to showcase cutting-edge e-propulsion balancing solutions, featuring Hofmann's force-measuring balancing machines and advanced spin testing systems with magnetic-resistant technology, specialized rotor support and high-precision measurements. HP Consulting offers expertise in specialized balancing tooling. Together, they provide comprehensive solutions for e-propulsion challenges in aerospace applications.

HP Consulting Services Limited

Booth: 108

Web: www.hpcsl.com

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IAAPS Limited

Booth: 170

Web: www.iaaps.co.uk

IAAPS is a center of excellence for advanced propulsion R&I with 11,300m² of state-of-the-art facilities. It brings together industry, academia, innovators and development specialists to deliver the skills and technologies needed in the transition to net zero. IAAPS' expertise spans automotive, aerospace and hydrogen to maritime, heavy-duty and off-highway.

Ingeteam

Booth: 162

Web: www.ingeteam.com

With over 50 years of experience and proprietary knowledge in electric motors, power management, converters and automation systems for various industries, Ingeteam jumps into the development of cutting-edge solutions for electric and hybrid aircraft. Ingeteam applies its expertise, delivering reliable, high-performance/high-efficiency electric propulsion and energy converters.

Maccon GmbH & Co. KG

Booth: 140

Web: www.maccon.de

With over 40 years of industry experience, Maccon is a leader in motors, drives and motion control solutions. It specializes in advanced motion control systems tailored for aerospace applications, offering high-performance electric motors, drives and controllers engineered to meet the stringent demands of hybrid and electric aircraft.

NEMA Ltd

Booth: 164

Web: www.nema.ltd.uk

NLR – Royal Netherlands Aerospace Centre

Booth: 134

Web: www.nlr.org

NLR is strongly involved in technology R&D to increase the maturity of aircraft systems for hydrogen propulsion. NLR's main technology focus areas and facilities include hydrogen fuel cell systems, thermal management, hydrogen electric systems and components, composite liquid hydrogen tanks, systems and material testing at deep cryogenic temperatures, and hydrogen technology flight testing.

Olsen Actuation UK Ltd

Booth: 102

Web: www.olsenactuators.com

Olsen Actuators & Drives specializes in electric roller screw actuators, DO160G and DO178C MIL-Spec/ space-ready motor drives and bespoke electromechanical solutions. The company helps reduce energy consumption and improve control, durability and space-saving with world-leading motion control technologies.

Opal-RT Germany GmbH

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Web: www.opal-rt.com/de

Technology and expertise in aerospace HIL testing: Opal-RT has developed strong partnerships in aerospace HIL testing over nearly two decades. The company's turnkey test benches, with purpose-built I/O and protocols, provide reliable real-time verification, validation and certification of aerospace control systems, serving both commercial and defense aircraft worldwide with consistent, proven technology.

Phase Motion Control SpA

Booth: 116

Web: www.phase.eu

PowerCell Sweden AB

Booth: 118

Web: powercellgroup.com

PowerCell is helping to create a world without fossil fuels. The company's technology makes tomorrow's solutions available today. PowerCell Group develops and manufactures fuel cell stacks and fuel cell systems with uniquely high power density. Its products are used in a wide range of industries, including aviation, marine and on- and off-road.

Raikhlin Aircraft Engine Developments GmbH

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Web: www.red-aircraft.com

RED Aircraft from Germany – home of the V12 – offers a full range of engineering services for customized engine and powertrain development of high-performance aviation engines from 200 to 600HP, single-lever FADEC, Jet-A1/SAF approved, with or without gearbox for hybrid electric propulsion up to FL500.

Safran Electrical & Power

Booth: 172

Web: www.safran-electrical-power.com

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Web: www.schenck-rotec.com

As a leading partner in the field of balancing and testing of rotating components for key and new players in the aviation industry, Schenck provides innovative solutions from R&D consulting and prototype testing to production and lifecycle services.

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Web: www.speedgoat.com

Speedgoat provides customers in the aerospace and defense domain with the quickest way to design with Simulink, prototype and test complex controls, DSP, and vision applications with hardware. The modular and high-performance architecture of Speedgoat target computers and protocol interfaces are especially well suited for innovations toward electrification and automation.

Transense Technologies plc

Booth: 104

Web: www.transense.com

Transense Technologies develops, manufactures and licenses advanced surface acoustic wave (SAW) wireless and passive sensor systems to measure torque, force, pressure and temperature. Its patented technology enables world-leading electric motor and drive, robotics, performance automotive, aerospace and industrial machinery companies to improve control, performance and efficiency.

University of Nottingham

Booth: 188

Web: www.nottingham.ac.uk

The University of Nottingham is a leading aerospace research and development partner with over 160 experts. It is home to world-class facilities including the £4m PEMC, which offers an unrivalled 20-megawatt demonstration capacity and three purpose-built laboratories, housing one of the world's largest research groups in electrification.

Vacuumschmelze GmbH & Co. KG

Booth: 184

Web: www.vacuumschmelze.com

Vacuumschmelze (VAC) is a leading global manufacturer of advanced magnetic materials. With extensive application expertise and outstanding experience in materials science and product development, VAC designs and provides its customers with optimal solutions in terms of performance and efficiency, while developing sustainable and advanced products.

Vector Informatik GmbH

Booth: 148

Web: www.vector.com

Vector Informatik is the leading manufacturer of software tools and embedded components for the development and test of electronic systems. For the aerospace industry, the Vector test tools CANoe and VT System provide a scalable and reusable solution from pure SIL simulations to HIL testing to functional acceptance tests.

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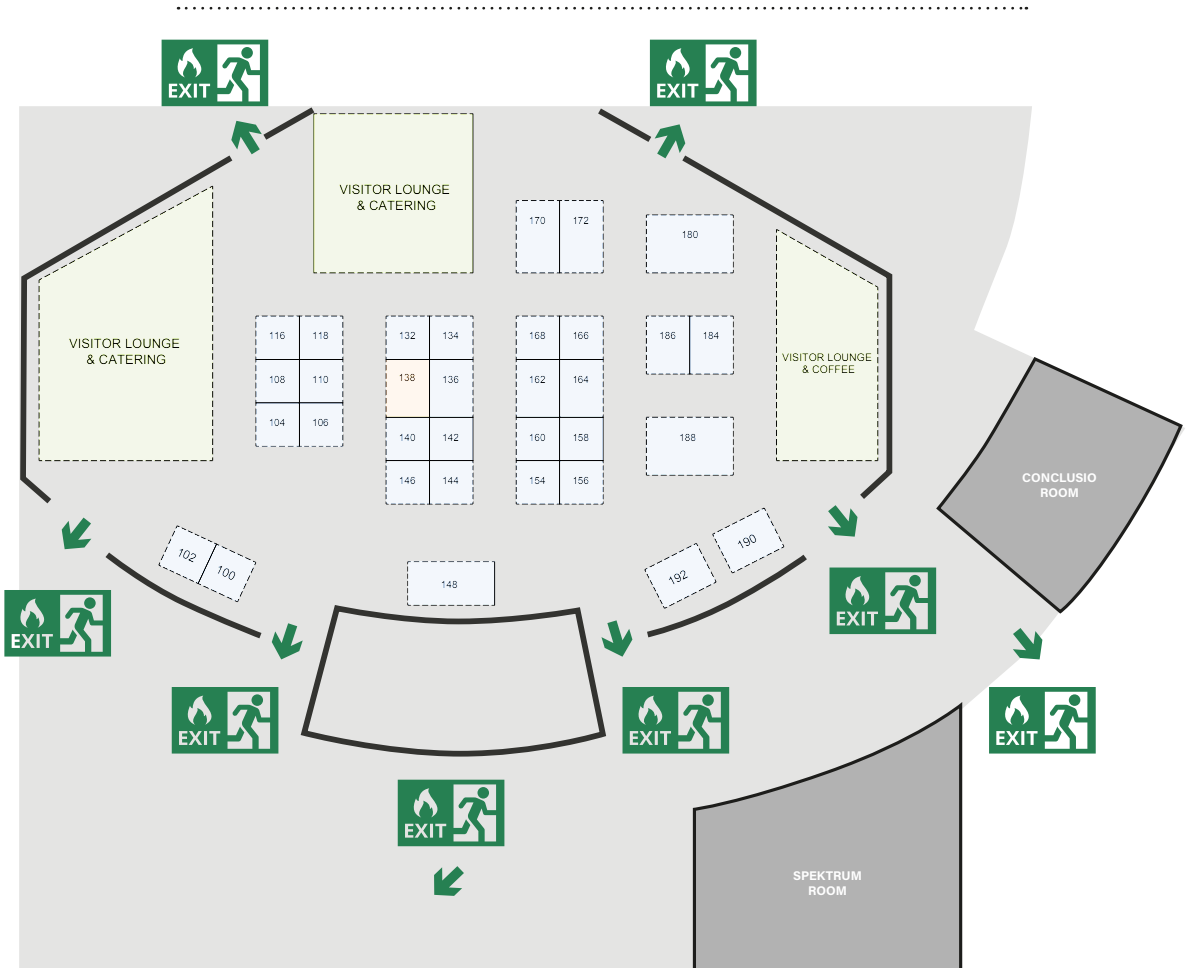
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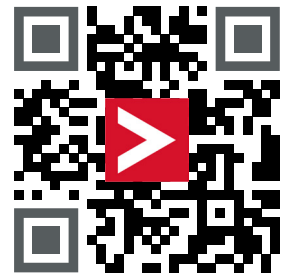
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