# electric & hybrid aerospace TECHNOLOGY SYMPOSIUM

Co-located with: HYDROGEN Technology EXPO EUROPE

**SEPTEMBER 27 & 28, 2023** | BREMEN, GERMANY

# CONFERENCE PROGRAM & SHOWGUIDE

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25 YEARS

# WELCOME TO ELECTRIC & HYBRID AEROSPACE TECHNOLOGY SYMPOSIUM

With 70+ speakers and 40 exhibitors, Electric & Hybrid Aerospace Technology Symposium is the world's leading international conference and exhibition dedicated to ultra-low-emission aircraft technology and full-electric flight possibilities. Plus, taking place alongside it this year is the world's biggest Hydrogen Technology Expo, which features over 550 of the world's leading hydrogen and fuel cell technology companies.

*"All aspects of aerospace activity, from general aviation, eVTOL and smaller regional aircraft to larger commercial airliners"*

Nine years on from its debut here in the Free Hanseatic City of Bremen, the symposium will see more than 70 expert speakers from around the world present their current views and findings. Hear from industry-leading companies such as Airbus, dSpace, GKN Aerospace, Evolito, GE Aerospace, Rolls-Royce and Saft, to name a few, while across the show floor, visitors can expect to see cutting-edge solutions to decarbonize the aerospace industry.

The event is in Bremen for just two days – September 27 & 28, 2023 – and will cover all aspects of aerospace activity, from general aviation, eVTOL and smaller regional aircraft to larger commercial airliners. Its purpose is to highlight the fast-paced development of hybrid propulsion, electrical subsystem architecture and more electric aircraft, and to discuss the vast body of research into the increased electrification of aircraft and the possibilities and challenges that brings.

Enjoy the show!

**General manager**
Richard de Courcy

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## ORGANIZED BY

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Tony Robinson

**EHATS general manager:**
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**Conference director:**
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**Exhibition operations manager:**
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## ORGANIZER'S OFFICE

If you require assistance in finding your way around the exhibition, the organizer's office is located inside the CCB foyer in Scharoun Room

## DELEGATE DINING

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

## SYMPOSIUM OPENING HOURS

**WEDNESDAY, SEPTEMBER 27**
**8:45am – 6:00pm**

**THURSDAY, SEPTEMBER 28**
**9:00am - 5:00pm**

## WI-FI

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

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## ACCESSIBILITY

Electric & Hybrid Aerospace Technology Symposium can be accessed via the Congress Centrum entrance, 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 Bremen staff

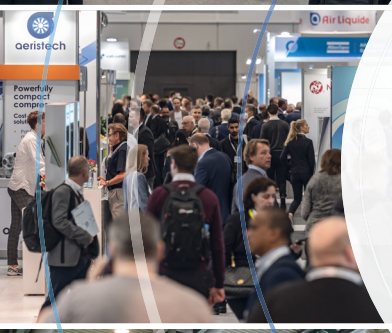
## SOCIAL MEDIA

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**

## EXHIBITORS A-Z





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# electric & hybrid aerospace TECHNOLOGY SYMPOSIUM

## SEPTEMBER 27 & 28, 2023

## Bremen, Germany

### EXHIBITORS A-Z

| | |
|---|---|
| ABB AG | 170 |
| AirBorn International Ltd | 210 |
| AKG Thermotechnik GmbH & Co. KG | 550 |
| Axter Aerospace | 620 |
| Axyal Propulsion | 130 |
| Ayed-Engineering GmbH | 125 |
| Bosch General Aviation Technology GmbH | 500 |
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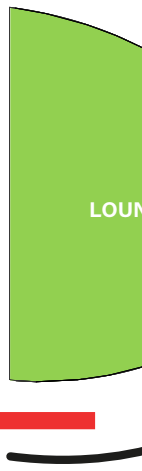



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# electric & hybrid aerospace TECHNOLOGY SYMPOSIUM

**SEPTEMBER 27 & 28, 2023** BREMEN, GERMANY

# CONFERENCE PROGRAM

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

### TRACK 1, FOCKE-WULF

- Commercial Aircraft Application Possibilities and Research
- Developing Infrastructure for New Aviation Needs
- Progress and Research in Battery Technologies
- The Path to Net Zero
- Electric Propulsion Technologies
- Certification and Standardization
- Developments in eVTOL

### TRACK 2, LLOYD

- Advanced Air Mobility
- Hybrid Electric Propulsion Technologies
- Testing, Validation and Simulation
- Hydrogen and Fuel Cell Technology
- Energy Carriers and Powerplants
- Improving Power Density, Weight and Efficiency
- Synergies Between Aviation and Other Industries


**70+** SPEAKERS

**2** CONFERENCE TRACKS

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# DAY 1, WEDNESDAY, SEPTEMBER 27 - TRACK 1

**08:45**

### Welcome and opening address

**Tony Robinson, founder of Electric & Hybrid Aerospace Technology Symposium, UKi Media & Events, UK**

**08:55 - 11:00**

## Plenary Keynote Session - Track 1

**Moderator:**
**Mark Scully,** head of technology – advanced systems & propulsion, Aerospace Technology Institute, UK

**08:55**

### Driving electrical power and propulsion systems for advanced air mobility to product

**Olaf Otto,** president, Rolls-Royce Electrical, Germany

Rolls-Royce develops differentiated power and propulsion technology for all-electric and hybrid electric advanced air mobility applications. Together with lead customers and partners, the first electric subsystems have been designed and are being tested. The prospect of supplying innovative power and propulsion systems for novel aviation market segments at scale requires a step change for all processes on the way from prototype to aerospace-grade products. Olaf Otto will give insights into Rolls-Royce's approach to delivering the innovative systems required for powering platforms in hybrid electric flight.

**09:20**

### Zero-emission propulsion for now and the future?

**Simon Taylor,** technical fellow, director new air-vehicle concepts & chief engineer, GKN Aerospace, UK

It is not a trivial challenge to reliably predict the future where a number of technical trajectories for zero-emission energy sources and aircraft exist. The relative merits and limitations of synthetic (and drop-in fuels), batteries, hydrogen electric and hydrogen combustion will be introduced at energy source, aircraft and operational levels. The outcome of this view on the future highlights cryogenic hydrogen, in particular, hyperconducting, and electric propulsion as an exciting and scalable prospect if we work together as an industry.

**09:45**

### Electric dreams: navigating the economic viability of urban and regional air mobility for airlines

**Kolin Schunck,** senior manager for strategic innovation & intelligence, Lufthansa Innovation Hub, Germany

In recent years, electric aviation has emerged as an exciting new frontier in air travel, promising to revolutionize the industry with cleaner, quieter and more sustainable aircraft. However, for airlines, the decision to invest in electric aircraft for urban and regional air mobility is not just a matter of environmental impact, but also of economic viability. In this keynote, we will explore the opportunities and challenges of electric aircraft for airlines operating in urban and regional markets. We will examine the factors that impact the economic feasibility of electric aviation, including the cost of batteries, charging infrastructure and regulatory frameworks. We will also consider the potential benefits of electric aircraft, such as reduced operating costs and increased flexibility in route planning. This keynote will provide insights into the strategic considerations that airlines must weigh when deciding whether to adopt electric aircraft for urban and regional air mobility, a glimpse of the fare charged to passengers, and potential business models for airlines. Attendees will gain a better understanding of the opportunities and challenges of electric aviation from an airline's perspective, and learn how to navigate this exciting and evolving field.

**10:10**

### Opportunities and challenges of hybrid-electric propulsion

**Remi Robache,** HEP – electrical project manager, Pratt & Whitney, Canada

Hybrid electric propulsion offers considerable potential to improve aircraft efficiency and reduce emissions across a range of different aircraft applications and thereby support the aviation industry's goal of achieving net-zero $CO_2$ emissions for air travel by 2050. Remi Robache will draw from Pratt & Whitney Canada's hybrid electric flight demonstrator program to explain the opportunities and challenges of this new propulsion concept, and how it intersects with other technologies and alternative fuels which are required to make aviation more sustainable. Based on a De Havilland Canada Dash 8 experimental aircraft, Pratt & Whitney Canada's demonstrator program is targeting a 30% improvement in fuel efficiency, compared to today's most advanced regional turboprop engines.

**10:35**

### Advancing regional hybrid electric propulsion for more sustainable aviation

**Dr Jose Rey Villazon,** technical program manager, GE Aerospace, Germany

The development of a CS25 class hybrid $H_2$ fuel cell electric propulsion system requires a technology maturation and validation program with a multilevel roadmap of design and testing platforms which ensure verification from the

components to the subsystem modules and finally to the aircraft system. This presentation shows a view on the architectures and key technology areas under development for such a propulsion system, to support the EU's SRIA objectives.

**11:00 - 11:30**
**Break**

**11:30 - 13:10**

## Commercial Aircraft Application Possibilities and Research - Track 1

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

**11:30**
### Making aviation sustainable: 100-plus seat zero-emission jets by 2030
**Julian Renz,** head of programmes, ZeroAvia, UK
In this session, Julian Renz will address the scope of carbon emissions generated by today's aviation sector and the challenges in emission reduction with existing solutions. He will then discuss emerging trends in aviation electrification and specifically cover ZeroAvia's breakthrough hydrogen electric powertrain technology for commercial aircraft. Most importantly, he will convey how innovations like ZeroAvia's will impact the aviation industry, what current major airline partners like British Airways and Alaska Airlines are trying to achieve when it comes to sustainability goals, and when we can expect to see large-scale, decarbonized commercial jets in our skies.

**11:50**
### Maintenance: an unexplored field for supporting entry into service?
**Rob Koedijk,** product development manager, AFI KLM E&M, Netherlands
As soon as the first commercial aircraft enter the market, they will need to be kept airworthy continuously. Changes in legislation will mean new requirements for organizations and the workforce. On the other hand, lessons learned and existing infrastructure for continuous airworthiness of existing aircraft can be used to support electric and hybrid aviation. Ultimately, an aircraft needs to fly and be reliable throughout its lifetime. How do we organize this support in time?

**12:10**
### Regional aircraft with novel propulsion – a commercial game-changer?
**Wim Lammen,** senior scientist – modelling & simulation, Royal Netherlands Aerospace Centre (NLR), Netherlands
**Siyi Hao,** project manager, Roland Berger Ltd, UK
Today, regional aircraft only play a small role in the aviation landscape. However, the question pops up if energy and propulsion revolutions – such as hydrogen and electric – will bring a game-changing improvement in performance and create substantially higher demand? The specific range and payload requirements in the regional market potentially open up a wider range of new propulsion technologies than large commercial aircraft, and this may have significant commercial implications. Roland Berger and NLR team up again this year to assess new propulsion technologies for regional aircraft, following our work on other segments in previous years.

**12:30**
### Comparison of cryogenic and conventional hydrogen electric powertrains for 48- and 96-pax concepts
**Dr Norman Wood,** technical fellow & aircraft architect, GKN Aerospace, UK
**Mike Hales,** aircraft system architect, GKN Aerospace, UK
This presentation will appraise the differences between cryogenic (e.g. hyperconducting) and conventional fuel cell powertrains and their impact upon the performance and scalability of fuel cell aircraft. The focus of this presentation is the application of PEM fuel cells as well as the application of technologies with the potential for an EIS between 2032 and 2040.

**12:50**
### A comparison of different degrees of hybridization on the e-Genius aircraft
**Prof Andreas Strohmayer,** university professor, University of Stuttgart, Germany
Since its first flight in 2011 the electric aircraft e-Genius, built and operated by the University of Stuttgart, has undergone several changes in its energy storage system and the related degree of hybridization. After starting out as a purely battery-electric aircraft and flying successfully for several years, it was first outfitted with an external Wankel range extender followed by the currently installed internal full-hybrid system, steadily increasing the degree of hybridization. The presentation covers the different versions of the aircraft's propulsion system as well as a comparison of the three powertrain variants based on actual flight test data. Furthermore, the scalability of the results into the 50-seat regional aircraft class is discussed, comparing it to the latest outcome of related research.

**13:10 - 14:10**
**Lunch**

**14:10 - 15:30**

## Developing Infrastructure for New Aviation Needs - Track 1

**Moderator**
**Darrell Swanson,** director and co-founder, EA Maven, UK

**14:10**

### Preparing the ecosystem for new (aviation) technologies

**Erik By,** manager, energy transition program, Avinor, Norway

The need for a transition to greener aviation is crucial. For Norway as a nation highly dependent on a well-functioning air transportation system, shortening the time it takes to develop, test and roll out more sustainable solutions is of particular importance. To facilitate the change we need to understand how the rest of the aviation ecosystem needs to align to allow for new technologies. We also need to understand how society and the way we think about mobility are affected. At the same time, new groups of stakeholders become important and necessitate collaboration across sectors. How can we work to accomplish accelerated innovation?

**14:30**

### Liquid hydrogen supply for $H_2$-powered aircraft

**Julian Hoelzen,** senior researcher, Leibniz University Hannover, Germany

Commercial aircraft powered by $H_2$ propulsion systems are currently developed by several companies. However, a cost-competitive fuel supply chain is also required for a successful entry into service. In this presentation, the techno-economics of green $LH_2$ supply chains to or at airports are shown and major trends analyzed. Furthermore, and based on an exemplary air traffic network, the operating costs of $H_2$-powered aircraft are finally determined.

**14:50**

### Optimizing the energy and charging infrastructure costs for electric aircraft

**Niek van Amstel,** airport planner, NACO, Netherlands

This research implements flexibility into a flight schedule to lower the charging peak power demand of electric aircraft. Additionally, it incorporates the energy provision in terms of renewable energy sources in combination with battery storage. Besides a daily operational model, an entire year has been subject to an energy balance-focused optimization for a case study on Bonaire. Costs were found to be significantly lower than for a fixed-flight schedule for an operational day while the yearly model identified the minimum optimized required energy infrastructure. Sensitivity analysis also showed possible airport energy business cases.

**15:10**

### Regional airport development of the future – requirements and emissions

**Markus Meindl,** researcher, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

With the electrification of aviation, airports are also facing challenges in adapting their infrastructure to operate hybrid electric aircraft. This paper presents the operation of several 50-pax regional aircraft at a regional airport. The operational requirements, aircraft emissions and expected ticket prices for regional flights are compared to conventional aircraft. These requirements are presented and evaluated for 2030, 2040 and 2050.

**15:30 - 16:00**

### Break

**16:00 - 17:40**

## Progress and Research in Battery Technologies - Track 1

**Moderator**
**Dr Christoph Gentner,** scientist, German Aerospace Center (DLR), Germany

**16:00**

### E-aviation certifiable lithium-ion technologies

**Rodolphe Boulais,** technical lead, emerging aviation products, Saft, USA

Which lithium-ion battery technology is best suited for today's wide range of advanced air mobility (AAM) e-aviation applications requirements? How can prospective battery technologies offer uncompromised levels of safety and reliability when required to deliver concurrently high-power discharge capabilities, high specific energy requirements and a high number of cycles? This paper proposes a review of some of the lithium-ion technology candidates best able to meet the demanding and challenging applications found in e-aviation today.

**16:20**

### Safety aspects of propulsion battery charging and hybrid operation

**Axel Lange,** CEO, Lange Aviation GmbH, Germany

For a battery, the charging phase is even more significant and relevant for safety than the discharging phase is. Therefore, a systematic approach to safety that considers all battery operation modes and involved aircraft components is required in order to certify a propulsion battery. The first EASA-certified onboard charger, as introduced by Lange Aviation, is used as an example in order to present various challenges linked to the charging of a propulsion battery. Safety aspects of inflight battery charging, as experienced with recuperating and hybrid propulsion systems, are also discussed.

**16:40**

### The challenges of aerospace batteries' thermal abuse design

**Zi Jian Yeo**, thermal simulation lead, Electroflight, UK

Li-ion propulsion batteries are becoming more common in new electric aircraft powertrain systems. The challenges in ensuring continuous safe flight during a battery fire event are significantly harder in aerospace compared to ground electric vehicles. The certification and regulations of batteries in aerospace are still evolving and will be discussed. Research into the topic of battery thermal runaway was conducted to gain insight into the problem. A first principles engineering approach is applied to analyze battery thermal runaway events and suggest guidelines for battery thermal abuse designs.

**17:00**

### Optimizing aircraft battery performance via thermal management

**Dr Martin Rogall,** lead battery engineer, Qdot Technology, UK

Electrification of propulsion systems demands batteries with long cycle lives, a high energy density and rapid rechargeability. Battery temperature plays a major role in all three, significantly reducing the battery's operating performance and capacity, in addition to introducing safety and stability concerns. Therefore, effective thermal management is a key factor in enabling the adoption of all-electric aircraft. The conventional approach to thermal management merely entails the prevention of overheating. However, as will be laid out in this presentation, it can instead be leveraged to optimize the performance, safety and durability of hybrid electric propulsion systems for UAVs and UAM.

## DAY 1, WEDNESDAY, SEPTEMBER 27 - TRACK 2

**11:30 - 13:10**

## Advanced Air Mobility - Track 2

**Moderator:**
**Diana Siegel,** director of strategy, Electra.aero, Switzerland

**11:30**

### UK city air mobility index

**Darrell Swanson,** director and co-founder, EA Maven, UK
**Jarek Zych,** director and co-founder, EA Maven, UK

Discover EA Maven's groundbreaking study on advanced air mobility (AAM) opportunities in the UK. From an initial analysis of 300+ cities and 13,000 routes, they've pinpointed 900+ viable routes across 260 cities. This study not only discusses potential routes but also the significant time and economic benefits of AAM. With the potential to save over 9,000 years annually for travelers switching from surface transportation, this equates to a boost of £2bn in economic productivity. Join us to delve into EA Maven's methodology and gain insights into how AAM can reshape intercity travel in the UK and be replicated in other jurisdictions.

**11:50**

### Aerospace-grade electrical propulsion systems for advanced air mobility

**Markus Christmann,** chief engineer urban air mobility, Rolls-Royce, Germany

Rolls-Royce develops differentiated power and propulsion technology for all-electric and hybrid electric eVTOLs and fixed-wing aircraft. Together with lead customers and partners, electric propulsion units have been designed, taking the specific requirements of different flight applications and missions into account. With the goal of certification within the next few years, their designs feature lightweight topology, novel thermal management solutions and the highest integration levels while aiming to meet the highest safety standards. The presentation will give an overview of the systems under design and their unique technological attributes, and an update on progress in the test labs.

**12:10**

### Dynamic infrastructure development for eVTOL/AAM public service operations

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

In the next decades, eVTOL/AAM systems will likely become essential tools for public service missions worldwide. However, public service infrastructure requirements could differ from UAM and personal/corporate operations. For fixed-base operations like local fire departments and EMS, a small take-off/landing site at or near the station with charging capability works best; but for disaster response, humanitarian aid, or fighting wildfire, dynamically allocatable assets and infrastructures are essential. For military applications, on-demand, fast-deployable platforms and infrastructures are necessary. Dynamically deployable infrastructures include mobile megawatt-charging systems (air/ground transportable), command and control, temporary vertiports, dynamic air space management, weather data links and a spares/maintenance network.

**12:30**

### Electric is taking off

**Ajay Lukha,** chief commercial officer (CCO), Evolito, UK

This presentation will share Evolito's learnings of how to gain a system-level advantage from next-generation electric propulsion architectures, and how these can accelerate the development of the eVTOL industry.

**12:50**

### Autonomous advanced air mobility using AI

**Dr Evgeni Ganev,** CEO, EMPS Consulting LLC, USA

**Arif Salam,** chief engineer for electromechanical actuation controls and electric power systems, Honeywell Aerospace, USA

The progression of electric and hybrid air mobility will be reviewed in line with the implementation of autonomous operation and artificial intelligence (AI) utilization. An entry into service roadmap will be presented for different classes of aircraft. Major obstacles for entry will be shown and quantified based on the platform's progression. Powertrain selection and the rationale for different vehicles will be included. Provisions for improvements and further progression will be presented and quantified. The progress is heavily dependent on an aggressive AI and autonomy use. Important conclusions will be summarized at the end.

**13:10 - 14:10**

### Lunch

**14:10 - 15:30**

## Hybrid Electric Propulsion Technologies - Track 2

**Moderator**

**Dr Evgeni Ganev,** CEO, EMPS Consulting LLC, USA

**14:10**

### Extending the range: powering hybrid electric platforms for advanced air mobility

**Frik-Jan Kruger,** chief engineer future programs, Rolls-Royce, Germany

Rolls-Royce develops differentiated electrical power and propulsion technology for both eVTOLs and fixed-wing aircraft. With the need for longer range and increased power, fully battery-electric solutions reach their limits. Together with partners, Rolls-Royce is therefore exploring different novel aircraft architectures including using fuel cells as energy storage and a turbo generator for power generation during flight. The presentation will feature comparisons of different architectural designs and give updates on progress in the development of scalable turbo generator technology and an outlook on moving fuel cell hybrid electric flight forward.

**14:30**

### Hybrid electric propulsion for general aviation: safe, sustainable, noiseless

**Dr Jean Botti,** CEO and CTO, VoltAero, France

Why will hybrid propulsion be a paradigm shift for general aviation? Is pure battery-only propulsion a viable solution with the current state-of-the-art for battery systems? The presentation will cover clean-sheet design versus refurbishment (pros and cons), the certification requirements (and challenges) for sustainable aircraft (CS23) and how a hybrid airplane compares in terms of cost of ownership as compared to today's best-in-class.

**14:50**

### Hybrid electric propulsion system to power blown-lift eSTOL aircraft

**Diana Siegel,** director of strategy, Electra.aero, Switzerland

Electra has developed and tested a hybrid electric propulsion system to power its blown-lift eSTOL aircraft, able to take off and land within an area the size of a soccer field. The hybrid system consists of a turbo generator and battery pack powering eight distributed electric propulsors arranged along the leading edge of the wing. This arrangement results in a multiplication of lift generated at slow speed, giving the aircraft the ability to lift off and land within 2-3 vehicle lengths. Electra has demonstrated this effect in prior wind tunnel tests and at subscale. Electra has recently integrated the hybrid system into its 2-seat technology demonstrator and will begin flight testing by Q3 2023. This presentation will discuss learnings and insights from the integration and testing of the hybrid propulsion system. Electra's future product is a 9-seat version of its eSTOL aircraft.

**15:10**

### Selecting 1MW class motors and generators for aerospace hybrid electric propulsion

**Cristian Anghel,** senior fellow, Honeywell International, USA

Recently 1MW class electric motors and generators have become one of the key technologies that support the goals of hybrid electric propulsion such as driving overall system efficiencies as high as possible and reducing system weight by increasing the power density and system simplicity. This presentation compares the characteristics, advantages and disadvantages of efficient, high-power density 1MW class electric machines based on permanent magnet and wound field technologies. Honeywell has an unparalleled generator and motor range for aerospace, based on more than 100 years of innovation and product development and has recently demonstrated an aerospace-grade 1MW electric machine.

**15:30 - 16:00**
**Break**

**16:00 - 17:40**

## Testing, Validation and Simulation - Track 2

**Moderator**
**Dr Nick Simpson,** associate professor in electrical machines, University of Bristol, UK

**16:00**
### Simulation and HPC in the cloud
**Dr Sandeep Sovani,** worldwide GTM head, simulation-HPC in the cloud, Amazon Web Services, USA
Today, simulation is a key part of product engineering. It enables engineers to rapidly and cost-effectively test and validate their designs. Today, most companies perform their engineering simulation on custom-built on-premises compute clusters. Finding that on-premises clusters are limiting in many ways, many companies are actively migrating their engineering simulation workloads to the cloud. The cloud provides access to vast computing resources on demand, providing elasticity and lower cost, enabling simulation engineers to run more simulations quicker, thus expediting the innovation process. This talk presents insights into how to scale simulations in the cloud, along with customer case studies.

**16:20**
### Variable speed drive-based dynamometer for high-power turboshaft engine testing
**Pieder Jörg,** corporate executive engineer, ABB, Switzerland
Traditionally water brakes or eddy current retarders have been used to load turboprop and turboshaft engines in development or routine testing. While water brakes have limited dynamics, eddy current retarders require power electronics for dynamic control. However, their low inertia allows testing with a representative mass-elastic load side. Electric variable speed drives offer the highest dynamic control even at very high power levels, however, motors come with significant rotational inertia. By employing modern control schemes for active inertia compensation and torsional damping, a 9000hp/6.7MW industrial drive was turned into a regenerative dynamometer. The challenges in motion control are presented, as well as practical experience from its commercial operation.

**16:40**
### Simulation software in sustainable aviation: from hybrid electric to hydrogen electric aircraft
**Dr Michael Sielemann,** aerospace industry director, Modelon, Germany
The most promising opportunities to improve aircraft efficiency and overall sustainability are in electrified propulsion concepts. These are designed and assessed virtually using simulation software. Here, the right amount of detail is required to allow informed decision making. However, it is slow and expensive to introduce superfluous detail. This presentation summarizes some typical choices in representing key components of propulsion concepts ranging from hybrid electric to hydrogen electric aircraft, and describes how their strengths and limitations cascade to aircraft-level projections.

**17:00**
### Hardware-in-the-loop testing of aircraft controllers
**Yves Gerster,** aerospace industry manager, Speedgoat, Switzerland
Explore next-generation aerospace design and testing workflows. Understand how hardware-in-the-loop testing expedites the testing and certification of hybrid, VTOL, or conventional aircraft. We will present examples of real-world certification processes and provide an overview of tools and methodologies that streamline the design verification phase. Moreover, delve deeper into battery testing, cell emulation, and powertrain development using Simulink Real-Time and Speedgoat real-time target machines.

**17:20**
### Accelerating aircraft development by improved testing on power level
**Soeren Reglitz,** product manager aerospace & defense, dSpace GmbH, Germany
The technological shift towards electric or hydrogen propulsion and more electric aircraft in general greatly benefits us all by enabling clean and sustainable aviation, but also introduces new challenges in its development process. The growing complexity of the electrical architecture on board aircraft requires additional control software and in-depth verification. However, development activities are usually distributed across different organizations, thus integration testing becomes increasingly challenging. Flexible virtualization strategies are required to cope with these challenges. This session will show how HIL testing on power level can help avoid bottlenecks in development by emulating batteries and electric machines at different operating conditions.

# DAY 2, THURSDAY, SEPTEMBER 28 - TRACK 1

**09:00 - 11:00**

## The Path to Net Zero - Track 1

**Moderator**
**Prof Andreas Strohmayer,** university professor, University of Stuttgart, Germany

**09:00**

### European electric and hybrid aviation towards climate neutrality by 2050

**Dr Niclas Dzikus,** DG research & innovation, policy analyst, European Commission, Belgium

A review of the EU aviation research landscape on electric and hybrid aviation towards climate neutrality by 2050.

**09:20**

### Creating new capabilities for net zero commercial aircraft

**Mark Scully,** head of technology – advanced systems & propulsion, Aerospace Technology Institute, UK

The ATI has published the *UK Aerospace Technology Strategy, Destination Zero*, which describes the path to net zero commercial aircraft by 2050. This presentation will explore new capabilities which are in development in the ATI portfolio of R&T projects and will thereby grow the aerospace sector's strengths to realize the 2050 target. The role of both ultra-efficient and zero-carbon propulsion system technologies will be explored, together with complementary advances in aircraft systems to support the future market.

**09:40**

### DEP trade-off study for a regional aircraft preliminary design

**Diego Giuseppe Romano,** fluid mechanics researcher, CIRA - Italian Aerospace Research Centre, Italy

This work is devoted to the investigation of the aerodynamic effects of a DEP installation on a regional aircraft for greenhouse gas emissions reduction. In the first part, a finite span section of the wing is considered with periodic boundary conditions by means of the RANS approach. The second part of the paper is devoted to trade-off studies on a complete wing by means of a combination of high-order and low-order approaches. The final objective is to identify a simplified procedure to support preliminary design. An experimental test campaign is ongoing in order to assess the numerical results.

**10:00**

### Aviation's roadmap to true zero

**Nikhil Sachdeva,** senior manager and lead for sustainable aviation, Roland Berger Ltd, UK

Aviation's global share of $CO_2$ emissions is expected to increase over time given the relative maturity of decarbonization solutions across other industries, and the footprint of its non-$CO_2$ effects such as contrails and $NO_x$ can be as much as two to four times compared to $CO_2$ alone. The Roland Berger Roadmap to True Zero for the global aviation sector focuses on six key levers for potential mitigation strategies, building on analysis of a broad range of potential outlooks, assumptions and emission sensitivities to develop five scenarios, each with a focus to bring aviation's total climate impact down to true zero, including both $CO_2$ and non-$CO_2$ effects.

**10:20**

### Accelerating sustainable innovation in aviation with the MBSE approach

**Lisa Belkhichane,** A&D industry value expert, Dassault Systèmes, France

The aviation industry has been facing the challenge of reducing its carbon footprint for decades and has made significant progress in fuel efficiency. Today, the global air transportation industry is committed to achieving net zero carbon emissions by 2050. To go even further in the reduction of aircraft emissions, the principal focus is now on new technologies such as electric aircraft and new fuels such as hydrogen. But while progress is being made, these disruptive solutions still face some challenges with respect to their overall impact on the environment. To address a truly end-to-end sustainable system, companies should approach the system-of-systems perspective.

**10:40**

### Smart SAF

**Juan Miguel Gonzalez,** operational manager, CITD Engineering and Technology, Spain

Carbon emissions are just one side of the climate impact of aviation. Non-$CO_2$ effects are around two thirds of the total effect, 85% of them linked to airplane contrails. Different solutions are being studied, such as sustainable fuels (SAF), the reduction of aromatics, modification of the routes to avoid specific areas, and avoiding the formation of condensation trails by flying at lower altitudes. CITD's smart SAF system is also targeting a new solution to the non-$CO_2$ effects where AI will be used for condensation trails prediction based not only on atmospheric data but also on added onboard airplane data analyses.

**11:00 - 11:30**

### Break

**11:30 - 12:50**

## Electric Propulsion Technologies - Track 1

**Moderator**
**Dr Christoph Gentner,** scientist, German Aerospace Center (DLR), Germany

**11:30**

### Liquid hydrogen cooling of electric propulsion system

**Dr Temoc Rodriguez,** chief engineer – Electric Propulsion Systems, Ricardo Plc, UK

Liquid hydrogen fuel cells are earmarked as one of the solutions to decarbonize long-haul transportation including aviation. Liquid hydrogen can be used to reject the heat generated by losses in the electric powertrain. To achieve this, the liquid hydrogen is first circulated through the cold plate of the propulsion inverter and then through the cooling jacket of the electric machine. The outgoing hydrogen is then fed to the fuel cell system. This results in a simpler, lighter and more efficient system. The design of the inverter cold plate and the electric machine cooling jacket and their operation are presented.

**11:50**

### Design process of a fully scalable fuel cell electric aircraft propulsion system for the GKN H2Gear Project

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

The use of a fuel cell system fueled by hydrogen gives opportunities to design a totally novel electric power system. Some of this arises from the use of liquid hydrogen as a cryogenic coolant source. The results provide significant advantages over conventional systems through the use of radical approaches. These advantages include gains in power density, scalability to large aircraft and advanced and effective protection schemes and will be described in the presentation.

**12:10**

### Efficient high-integrity winding technologies for electric propulsion machines

**Dr Nick Simpson,** associate professor in electrical machines, University of Bristol, UK
**Dr Josh Hoole,** lecturer in systems engineering, University of Bristol, UK

Electrical machines for future aircraft propulsion will need to push the boundaries in power density without compromising reliability. Against sector technology roadmaps there are still significant improvements required and the desired power to weight, efficiency and integrity will not be achieved through incremental developments. This presentation will explore the potential of rethinking how we manufacture and design high-performance electrical machine windings. Examples of recent developments will be given covering metal additive manufacturing, high-integrity insulation systems, the application of probabilistic design principles to the prediction of winding failure and the use of composite materials to realize an air-gap winding stator.

**12:30**

### EcoPulse – a distributed electric propulsion demonstrator

**William Llobregt,** new energies & concepts – propulsion engineering, Airbus SAS, France

Exploring and pushing forward technological bricks on distributed electric propulsion: that is the goal of the flight demonstrator Ecopulse. This collaborative project has been undertaken with Airbus, Daher and Safran, with the support of France's Civil Aviation Research Council (CORAC) and the French Civil Aviation Authority (DGAC), to enable our future aircraft to further support decarbonization. Airbus is involved in the development of a high-energy-density battery, aerodynamic and acoustic integration and the development of a flight control computer system. Some key objectives are to contribute to new energy learnings, identify appropriate methods and associated simulation models and evaluate aerodynamic and acoustic gains.

**12:50 - 13:50**

### Lunch

**13:50 - 14:30**

## Certification and Standardization - Track 1

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

**13:50**

### Certification of propulsion batteries as a key enabler for electric and hybrid

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

One of the key enablers for electric aircraft is propulsion batteries. As with any relatively new technology there is limited experience of its use as an energy storage device in electric/hybrid aerial vehicles. Lithium batteries have specific failure, operational and maintenance characteristics that differ from conventional batteries currently covered by normative aviation certification. Therefore, new appropriate certification materials and qualification standards have been established to ensure that these battery installations do not have hazardous or unreliable design characteristics. The presentation will give an overview of the certification materials and qualification standards used in the certification of propulsion batteries.

**14:10**

### Certification of electric hybrid aircraft – field experience

**Frank Kaiser,** senior certification consultant, ADSE Consulting and Engineering, Netherlands

Driven by the need for sustainable aviation as well as technical possibilities, numerous initiatives are ongoing to develop and certify electric or electric/hybrid aircraft, such as VTOL, hydrogen/electric, SAF/electric. Authorities and industry are working together to develop certification specifications and special conditions. Safety principles are generally understood, however, how to design new aircraft to support safety requirements and how to show compliance is still novel territory. Additional challenges are posed by startup organizations and investor interests. This presentation addresses some of the recent field experience working in airworthiness office roles and industry standardization working groups and the hurdles still ahead.

**14:30 - 14:50**

### Break

**14:50 - 16:30**

## Developments in eVTOL - Track 1

**Moderator**
**Cristian Anghel,** senior fellow, Honeywell International, USA

**14:50**

### Safety-driven design and sizing of a multirotor VTOL powertrain for continued safe passenger air transport

**Florian Jäger,** research scientist, German Aerospace Center, Germany
**Nabil Hagag,** PhD candidate, German Aerospace Center, Germany

Within the DLR internal project HorizonUAM, which encompasses research related to numerous UAM topics, a safe propulsion system concept for a multirotor intracity eVTOL vehicle used for passenger transportation in the urban air mobility context was developed. This presentation aims to provide an overview about the safety-driven design process and its sizing results. Using a model-based systems engineering approach the propulsion system was designed and sized based on the concept of operations requirements, contingency capability for failure conditions, EASA SC-VTOL certification requirements using the safety assessment method ARP 4761, and the thermal management requirements.

**15:10**

### Battery diagnosis system for eVTOL aircraft battery module

**Dr Anup Barai,** associate professor, WMG, University of Warwick, UK

The battery safety diagnostic system implemented by automotive BMS is perceived to be the best in class. This is due to its high volume, which enables exploitation of the latest technology and commercial advantages. Yet, the diagnostic and prognostic capabilities implemented are limited. For electric aircraft, the fundamental premise of safety, plus the need to monitor, identify and isolate or mitigate battery failure is different. However, the tightly regulated aircraft usage case opens a few novel approaches to realize a comprehensive diagnostic and prognostic system. At WMG, in collaboration with aerospace OEMs, we have developed a battery functional safety diagnostic system.

**15:30**

### Application of the Coandă effect to eVTOL design

**William Tahil,** research director, Meridian International Research, France

Research into the Coandă effect or fluid entrainment has been ongoing for 100 years. Fascinating results in aerodynamic and hydrodynamic performance have been achieved with the most notable application being the rotorless helicopter tail control system, NOTAR. Adoption of the technology by the legacy aerospace industry has been slow; therefore Coandă technology presents an opportunity for the new generation to significantly improve the marginal performance of eVTOL aircraft using fluid flow entrainment design principles. This presentation forms a review of the most significant research results that have been published and potential design improvements and benefits for future eVTOL aircraft.

**15:50**

### Electrified aerospace propulsion needs a system-level engineering approach

**Jordan Craven,** senior engineer, Drive System Design, UK

Certification often makes design iterations prohibitively slow, with spiraling costs and time-to-market a major challenge. Engineering at a system level is crucial to avoid non-optimized eVTOL propulsion and aircraft designs. This extends beyond motor, transmission and inverter, to propeller geometry and aircraft structures. A process to develop systems concurrently and assess system architectures, electric motor/inverter technologies and propeller designs is presented. Simulation tools enable the assessment of key parameters including power density, efficiency, redundancy and sustainability for thousands of options, identifying potential non-intuitive solutions. This allows for quick data-driven decision making, enabling the future of aircraft propulsion systems.

**16:10**

### An investigation of eVTOL aircraft configuration

**Zhiheng Lou,** technical lead and project manager, IET Limited, UK

Driven by the demand for sustainable aviation, eVTOLs have gained significant public interest and investments. Unlike conventional aircraft designs, there is an abundance of eVTOL concepts that are differentiated by their aircraft configuration. Previous studies of eVTOL concepts involve making assumptions about the electric propulsion system. Consequently, valuable insights into the sensitivities of aircraft performance to component selection are lost. However, these insights are critical to eVTOL's success. Therefore, this study sought answers to how many rotors an eVTOL should have; how many rotors should be vectored; and what is the eVTOL's range for different mission scenarios?

## DAY 2, THURSDAY, SEPTEMBER 28 - TRACK 2

**09:00 - 10:40**

## Hydrogen and Fuel Cell Technology - Track 2

**Moderator**

**Roel van Benthem,** senior R&D engineer, Royal Netherlands Aerospace Centre, Netherlands

**09:00**

### Thermal management: don't let low-grade heat drag you down

**James Colley,** product development lead, Net Zero Aero Systems, Reaction Engines, UK

Historically, gas turbines reject the majority of their waste heat with their exhaust. Electric aircraft do not have this luxury and yet thermal management is historically considered late in the design process. A key driver of airframe efficiency, a systems approach to thermal management is needed with novel technology pushing the bounds of what can be achieved. Reaction Engines' expertise and game-changing microtube heat exchangers represent enabling technology for zero-emission aviation. Through case studies, such as Project Newborn, Reaction Engines examines the development of these solutions to combat the real thermal management challenges that the industry is facing.

**09:20**

### Challenges of hydrogen fuel cell powertrains for aircraft applications

**Dr Christoph Gentner,** scientist, German Aerospace Center (DLR), Germany

This presentation provides an overview of the integration of hydrogen fuel cell powertrains in aviation. The focus is on the assessment of suitable aircraft types and the anatomy of the energy system. In addition, the presentation delves into the critical aspects of sizing aircraft fuel cell systems. The interplay between the hydrogen fuel cell energy system and the aircraft is also discussed. Finally, the presentation covers the use of liquid- or air-cooled fuel cell stacks, the function of air compressors, strategies for cold start and measures to maintain optimal membrane humidity conditions.

**09:40**

### Test facilities for liquid hydrogen research at the Royal Netherlands Aerospace Centre

**Roel van Benthem,** senior R&D engineer, Royal Netherlands Aerospace Centre, Netherlands

The Royal Netherlands Aerospace Centre (NLR) was a significant participant in the EU's Clean Aviation and Clean Hydrogen projects as well as in national programs. An overview of the progress made and the development of new test facilities will be presented. This ranges from drone flights with hydrogen propulsion, both gaseous and liquid; the development of a hydrogen range extender for NLR's research aircraft; material test capabilities at cryogenic temperatures; and the development of a new ground facility for testing fuel cell powertrains and liquid hydrogen storage tanks for future aircraft.

**10:00**

### Powertrain architectures for hydrogen and electric aircraft

**Joe Stonham,** principal research engineer, fuel cell systems, GKN Aerospace, UK

Fuel cell power systems (FCPS) offer the potential to reinvent power generation systems (PGS) and propulsion systems beyond what is possible with state-of-the-art aircraft. This presentation will introduce the flexibility and complexity of today's aircraft power systems as well as the potential new paradigm in simplicity afforded by fuel cell hybrids when applied to cryogenic and conventional fuel cell power systems.

**10:20**

### Emission-free, electric flight with hydrogen

**Steffen Flade,** chief engineer, H2Fly, Germany

Gliding through the air with zero emissions and low noise? Is this what the future of air travel looks like? How close is this future? Prof. Dr Josef Kallo, founder and CEO of H2Fly, gives an insight into current developments, challenges and prospects for hydrogen electric powered aircraft.

**10:40 - 11:10**

### Break

**11:10 - 12:10**

## Energy Carriers and Powerplants - Track 2

**Moderator**
**Florian Hilpert,** head of aviation electronics, Fraunhofer IISB, Germany

**11:10**

### 200kW hydrogen fuel cell power plant development and flight test status

**Dr Anita Sengupta,** CEO/founder, Hydroplane Ltd, USA

Hydroplane is developing a modular 200kW hydrogen fuel cell powerplant to provide electric propulsion and hydrogen storage for single engine aircraft, rotorcraft and eVTOL platforms. The system is based on a high specific energy and volume modular stack, with lightweight bipolar plates and high-durability membrane technology. The balance of the plant includes a lightweight air compressor and liquid hydrogen feed system. We will present on the development status including ground testing, certification and flight test results and findings. Hydroplane is a two-time winner of the Agility Prime Program, as well as the California Energy Commission Caltestbed Program, furthering its innovative energy storage technology development and certification.

**11:30**

### Sodium borohydride as an energy carrier for aviation

**Alte de Boer,** senior R&D engineer aircraft electric technologies, Royal Netherlands Aerospace Centre (NLR), Netherlands

Is sodium borohydride (SBH) a feasible carrier of hydrogen on board aircraft? Can it be considered an alternative to liquid and gaseous hydrogen storage methods? There are potential advantages of applying SBH: storage takes place under atmospheric conditions in a powder (or dissolved in water) and hydrogen release does not need additional thermal energy. We present the results of a first feasibility study on the application of SBH in aviation. Multiple SBH fuel variants – with different amounts of water and with corresponding fuel processing architectures – were analyzed and simulated in the context of a regional aircraft mission.

**11:50**

### High-performance hybrid electric applications

**Eric Bartsch,** CEO, VerdeGo Aero, USA

Much of the focus on hybridization has been on achieving high efficiency. This is a very valid design space but it isn't the whole picture when it comes to applications of hybrid electric propulsion. VerdeGo Aero has also been developing hybrid powerplants for very-high-performance missions and aircraft. These powerplants share some attributes with other hybrids but also have novel aspects that are particularly interesting for very-high-speed VTOL missions. The combination of both high-efficiency and high-performance applications for hybrid technologies will accelerate the maturity of the next generation of powerplants.

**12:10 - 13:10**

**Lunch**

**13:10 - 14:50**

## Improving Power Density, Weight and Efficiency - Track 2

**Moderator**
**Dr Josh Hoole,** lecturer in systems engineering, University of Bristol, UK

**13:10**

### Evaluation of technology gravimetric indexes for zero-emission regional flight

**Camillo Manriqe,** research fellow, Leonardo Aircraft, Italy

The regional market segment is considered to be a key entry point for zero-emission flight. In this session, Camillo Manrique will present a methodology based on a mission flight analysis able to evaluate the requirements in terms of power-to-weight and energy-to-weight gravimetric indexes for battery-electric and hydrogen electric propulsion architectures. Results will include a retrofit of a conventional tube-and-wing regional aircraft, in which turboprops are replaced with a novel powertrain and its relative energy carrier to simulate a design, and typical missions including the alternate destination and loiter phases.

**13:30**

### Insulation materials on aluminum conductors provide solutions for aerospace challenges

**Dr David Simkin,** head of the DER Winding Centre of Excellence, University of Warwick, UK

The increasing voltages used in aerospace and the altitude challenges create a need to provide innovation in insulation materials to reduce insulation damage due to partial discharge. The light weight of aluminum and its higher resistance to high-frequency eddy current compared with copper opens opportunities for aerospace usage. The presentation will report results on the oxide coating of aluminum and compare this coating with results from enamel- and PEEK-coated aluminum wires. We will discuss the effect of the insulation properties on the thickness and degradation of the coatings in operational conditions. Thermal properties will be reported.

**13:50**

### Power electronics as enablers for fail-operational high-voltage drivetrain architectures

**Florian Hilpert,** head of aviation electronics, Fraunhofer IISB, Germany

Power electronics enable the linking of electric power busses of different voltage forms and levels like single/multiphase AC and DC lines. The necessary AC-DC and DC-DC converter systems have increased lately in system power density through wide bandgap semiconductor devices, resulting in advantages on system integration and efficiency. Modular internal designs allow for fail-operational high-voltage drivetrain architectures, addressing future MW class drivetrain architectures.

**14:10**

### Inverter emulator as test system for aerospace electric power systems

**Gernot Pammer,** business development manager power electronic test systems, AVL List GmbH, Austria

This publication shows a novel method to use a power hardware-in-the-loop-based (PHIL) inverter emulator (PHIL-IE) as an efficient test tool along the product lifecycle. In early R&D phases, it can be used as a highly efficient rapid prototyping tool to shorten R&D cycles and test a future converter system under real-life conditions. In later states, the same PHIL-IE, by using different HIL-based application models, is used for single component tests. In iron birds, the novel test method can be perfectly combined with HIL-based digital twin emulations to reduce test costs and time significantly.

**14:30**

### Critical package last-mile delivery – whatever the weather?

**Mike Eggleston,** chief executive officer, CAV Systems, UK

The future of small unmanned aerial systems (sUAS) or drone applications, whether for the delivery of consumer goods, medical supplies, emergency response, or research instrumentation, includes missions beyond visual line-of-sight (BVLOS) and penetration into clouds. Adverse weather conditions, particularly inflight icing, will be a significant hurdle to overcome. Therefore, reducing ice accretion using an ice protection system is critical. Equally, any system must not impact on its ability to carry a payload effectively. This presentation focuses on research and system development carried out by CAV Systems to address these issues and provide an effective, low-powered ice protection scalable solution.

**14:50 - 15:10**

### Break

**15:10 - 16:30**

## Synergies Between Aviation and Other Industries - Track 2

**Moderator**

**Dr David Simkin,** head of the DER Winding Centre of Excellence, University of Warwick, UK

**15:10**

### Development and manufacturing roadmaps for high-performance electrical machines

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

Innovative technologies and manufacturing processes are key in developing propulsion drivetrains which can meet the demanding requirements for more-electric flight. The presentation will cover roadmaps for key enabling technologies and manufacturing processes to enable wider adoption of electrified drivetrains. Cross-sectoral learnings from automotive and other industries will be brought to bear. A number of case studies of technology demonstrators will be presented to highlight how innovative roadmaps can impact key performance metrics.

**15:30**

### Proven automotive-based solutions (products and services) as enablers for sustainable aerospace

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

Zero-emission mobility as a common goal across industries – whether on the road, in the air or in space – motivates us to develop advanced automotive-based solutions for the future of mobility. We believe that it is key to utilize synergies across these industries to speed up and enable the technological transition. We will present the preliminary research results of our $H_2$ activities. We will focus on the benefits, potentials and hurdles for future aerospace solutions based on our experience in different product areas and projects such as fuel cell peripheral components, automotive-based high precise microelectronics, advanced adhesive manufacturing processes and advanced electronic manufacturing solutions.

**15:50**

### Product and manufacturing aspects for high-efficiency electric propulsion components using wave winding technology

**Oliver Schwab,** head of project management & sales, Compact Dynamics, Germany
**Dr Florian Sell-Le Blanc,** manager advanced e-motor technologies, Schaeffler Automotive Buehl GmbH & Co. KG, Germany

Based on current and future market requirements, Schaeffler will present the latest technology trends in terms of product design and manufacturing technologies for electric machine components. The transfer of automotive manufacturing technologies into aerospace applications is presented by electric motor product technology such as the wave winding technology and cost-efficient motor manufacturing technologies. Moreover, Schaeffler will show that the mechanical components of electric machines play an important role in achieving the challenging power density and reliability requirements.

**16:10**

### Crossing the gap to aerospace for hydrogen flight

**Jonathan Brown,** strategy director, Hypermotive, UK

Some of the greatest challenges in developing future hydrogen propulsion systems lie in the 'invisible' art of integration. Matching, optimizing and ensuring seamless control and communication of subsystems in an efficient and safe manner is critical. The engineering effort is immense to get a product powered by hydrogen to market. To do this in aerospace the challenge is further multiplied. What can we learn from other sectors to simplify and reduce the cost of future hydrogen propulsion systems in aerospace? This talk will review challenges and look at how innovation and lessons in integration from other sectors create new possibilities for aerospace.

*This program may be subject to change

# EXHIBITOR INTERVIEW: MIGUEL SUÁREZ, CEO, AXTER AEROSPACE

***DESCRIBE YOUR COMPANY***

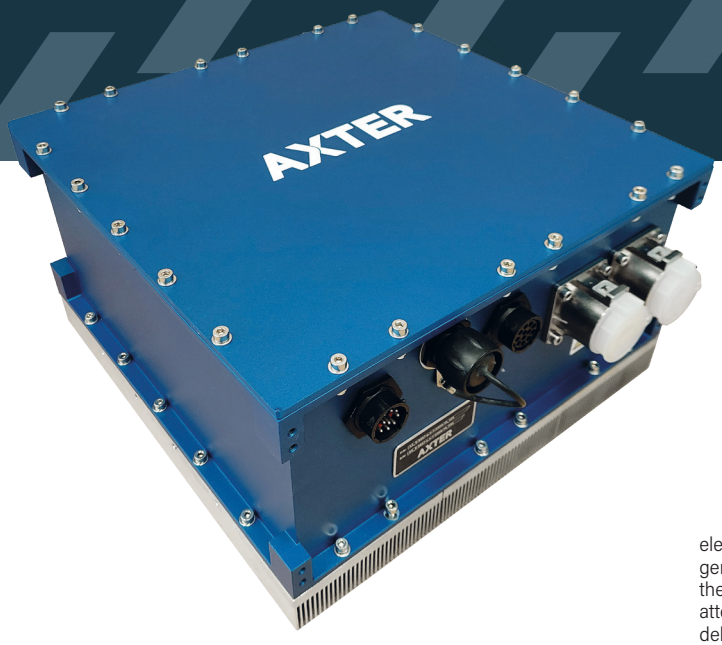
Axter Aerospace was established in Madrid in Spain in 2011 with the objective of developing hybrid/electric propulsion systems for aviation. We created the world's first hybrid kit for light sport airplanes, pioneering the first fully operational hybrid airplane, which successfully took its maiden flight in 2014.

Axter is an integral part of the CT family, a leading technological company that provides innovation and engineering services in the aeronautical, space, naval, automotive, rail, energy and industrial plants sectors. With over 35 years of experience, today CT's success is driven by more than 1,800 talented employees based in nine countries, spanning three continents.

Axter Aerospace, with its team of nine engineers, is currently experiencing exponential growth, backed by the support of CT. We are equipped with a full testing laboratory and a short serial production line that is already operational, further contributing to our expansion and achievements.

***HOW CAN AXTER HELP THOSE SEEKING TO DEVELOP ELECTRIC AND HYBRID AIRCRAFT AND/OR MORE SUSTAINABLE AVIATION?***

The company is steadfast in its commitment to research and development. Drawing from 12 years of extensive experience, Axter boasts proprietary battery management system




technology for lithium battery applications. Furthermore, it has developed its own bidirectional controllers (advanced BLDC motor controller) across a power spectrum ranging from 30kW up to 1MW.

Axter has successfully crafted tailored batteries with stringent technical specifications, which feature both high power and high energy outputs for very diverse applications.

Our expertise makes us a valuable partner for individuals and organizations aiming to advance electric and hybrid aircraft, and to develop a more sustainable aviation industry.


### *CAN YOU GIVE AN EXAMPLE OF HOW YOU HAVE HELPED?*

Our technology has been seamlessly integrated into an extensive array of aircraft designs, including fixed-wing aircraft, zeppelins, solar-powered airplanes, vertical take-off and landing vehicles, airboats and other naval and terrestrial transportation types.

Today the company specializes in power electronics and battery systems for hybrid/electric propulsion, as well as electrical generation and distribution systems within the aerospace and defense sectors. As attested by our clients, Axter excels in delivering outstanding products within remarkably short timeframes.

### *WHAT ARE SOME OF THE KEY CHALLENGES FACING THE ELECTRIFICATION/ HYBRIDIZATION OF THE AEROSPACE SECTOR?*

Key challenges include the need for reliable technology and tailored expertise, as well as customized development and integration with the aircraft.

At Axter, we offer engineering development services to our clients for hybrid/electric propulsion, energy storage and electrical systems. Our solutions are not only customized but also infused with Axter technology. Additionally, we provide batteries and electric motor/generator controllers, as well as AC-DC and DC-DC converters tailored to the specific needs of our clients.

We support the entire value chain, starting with tailored design, prototyping, testing and validation, qualification and finally, production.

### *WHAT IS YOUR KEY MESSAGE TO THOSE ATTENDING THE SYMPOSIUM?*

Embrace the future of aviation with us! Experience our innovative technology, customized solutions and commitment to sustainability at Electric & Hybrid Aerospace Technology Symposium. Let's shape the skies together!

## A

### ABB AG
**Booth: 170**
**Web:** campaign-pa.abb.com/Test_Systems
ABB's mission is to equip its testing customers as competent partners with technologically high-quality solutions for high-performance drive technology and automation tasks, using PAISI2020 in customer-specific and tailor-made turnkey applications. This is how ABB creates the basis for joint sustainable business success. Visit the booth to learn more.

### AirBorn International Ltd
**Booth: 210**
**Web:** airborn.com
AirBorn designs and manufactures tough, high-reliability power systems which do not fail, operate in environments from -55°C to 105°C and are designed to withstand the most violent shock and vibration requirements. 100% factory ESS testing programs are available on each deliverable.

### AKG Thermotechnik GmbH & Co. KG
**Booth: 550**
**Web:** www.akg-group.com
For more than 100 years, AKG has been a leading supplier of high-performance heat exchangers and cooling solutions. Today AKG is a renowned partner for the aerospace industry, supplying different kinds of coolers for aircraft, helicopter and engine applications including electric and hybrid electric powertrains and systems based on batteries and hydrogen.

### Axter Aerospace
**Booth: 620**
**Web:** axteraerospace.com
Axter is specialized in the development of hybrid/electric propulsion, electrical generation and distribution and battery systems for aerospace and defense. Proprietary technology includes electric motor/generator controllers from 30kW up to 1MW, AC-DC and DC-DC converters and battery systems, including a proprietary smart BMS.

### Axyal Propulsion
**Booth: 130**
**Web:** www.axyal.com
Axyal, part of Magnax, accelerates the innovation of propulsion systems by developing yokeless axial flux motor and inverter solutions that excel in power density, efficiency and reliability.

### Ayed-Engineering GmbH
**Booth: 125**
**Web:** www.ayed-engineering.com

## B

### Bosch General Aviation Technology GmbH
**Booth: 500**
**Web:** www.bosch-aviation.com
Bosch Aviation Technology is an enabler for sustainable aviation by transferring automotive engineering and manufacturing solutions to the aviation and space industries. Bosch Aviation Technology is keen to deep dive into the established Bosch automotive portfolio to find the perfect solution for your need. Please contact www.bosch-aviation.com.

### Bremen/Bremerhaven – City of Aerospace C/O Aviaspace Bremen eV
**Booth: 640**
**Web:** www.aviaspace-bremen.de/en
Located in the City of Aerospace in the Federal State of Bremen, more than 140 companies and 20 scientific institutes drive the aerospace industry. With around 12,000 employees, the industry generates over four million euros per year. The State of Bremen is planning to establish a UAS control center in Bremen.

## C

### Carpenter Electrification
**Booth: 310**
**Web:** www.carpenterelectrification.com
Carpenter Electrification is a leading expert in soft magnetic alloys, with 80 years of experience. It focuses on enhancing electric vehicles, aircraft, drones and robotics through advanced materials for motors and electronics. Carpenter Electrification collaborates with customers to develop and scale power-dense motors, prioritizing fully electric transportation.

### CAV Systems
**Booth: 510**
**Web:** www.cav-systems.com
Fly safer, further and greener: CAV is a leading provider of ice protection and drag reduction technology. It specializes in critical safety systems that can significantly increase aircraft efficiency for general and commercial aviation and unmanned and urban air vehicles.

### Cotesa GmbH
**Booth: 100**
**Web:** www.cotesa.de
Cotesa is a leading manufacturer of high-quality fiber composite components for aircraft construction, automotive and other industries. With over 400 employees at three locations, the company develops and produces customized solutions for components and assemblies. Cotesa is EN 9100 and Nadcap composites certified and offers the highest quality in prototyping and series production. You benefit from experienced staff, modern production facilities and a strong customer focus.

## D

### DLR
**Booth: 160**
**Web:** www.dlr.de
DLR conducts research on fuel cell propulsion systems for aircraft. It combines experimental and numerical methods to study critical operating states and the influence of components on the powertrain system, thereby identifying technology gaps for the aviation industry and improving the design of fuel cell propulsion systems.

### Drive System Design Ltd
**Booth: 520**
**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.

### dSpace GmbH
**Booth: 340**
**Web:** www.dspace.com
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.

## E

### Electric & Hybrid Aerospace Technology Symposium 2024
**Booth: 610**
**Web:** www.electricandhybridaerospacetechnology.com
Launched in 2015, Electric & Hybrid Aerospace Technology Symposium is the premier event for high-level aerospace engineers and designers, leading research academics, propulsion engineers, aircraft manufacturers, heads of electrical system design and engineering, and anyone working on developing the future of aircraft technology. Book your booth now for 2024.

### EN4 Srl
**Booth: 650**
**Web:** www.en4.it
EN4 develops and supplies complete test solutions for eVTOL development. The team efficiently serves customers for individual component testing or complete testing labs, in a unified supply process. With EN4's advanced expertise and flexibility, it's possible to overcome even the most ambitious challenges for the vehicles of the future.

### Evolito Ltd
**Booth: 150**
**Web:** www.evolito.aero
Evolito is making all-electric flight a commercial reality by offering world-leading electric propulsion systems for the aerospace market, including electric motors, controllers and custom battery solutions. Evolito leverages breakthrough axial flux motor technology proven at scale, to meet the needs of electric and hybrid aviation customers.

## F

### Fraunhofer Institut IISB
**Booth: 680**
**Web:** www.iisb.fraunhofer.de
The Fraunhofer IISB in Erlangen, Germany, specializes in wide-bandgap semiconductors and power electronics. The spectrum ranges from basic materials, semiconductor devices and process technologies, power electronic modules and components to complete power electronic and energy systems. Fraunhofer's solutions set benchmarks in energy efficiency and performance, even for extreme operating conditions.

## G

### Gamma Technologies GmbH
**Booth: 630**
**Web:** www.gtisoft.com
Gamma Technologies develops and licenses GT-SUITE, a leading multiphysics CAE simulation software. GT-SUITE includes a complete library of physics-based modeling templates covering the entire development cycle from concept to validation. GT-SUITE provides unified and state-of-the-art system simulation capabilities for electrified vehicles.

### GKN Aerospace Services Limited
**Booth: 410**
**Web:** www.gknaerospace.com
GKN Aerospace is the world's leading Tier 1 aerospace supplier, serving aircraft manufacturers worldwide with aerostructures, engine systems and EWIS. GKN Aerospace is strongly committed to sustainability, providing lightweight composites, AM, electrification and hydrogen propulsion systems to reduce weight and emissions on aircraft. GKN Aerospace operates in 12 countries at 38 sites.

### Glenair GmbH
**Booth: 120**
**Web:** www.glenair.de
Glenair is a leading manufacturer of advanced interconnect technologies. The company is MIL-Spec certified and also 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.

## H

### Harmonic Drive SE
**Booth: 260**
**Web:** www.harmonicdrive.de
Harmonic Drive SE, a decades-old pioneer, supplies high-precision, backlash-free gears and robust electromechanical actuators to the aerospace industry. Its products excel in durability, showcased by 40 maintenance-free years in space and over 30 reliable years in aircraft wings. Trust Harmonic for consistent reliability and high-quality products.

### Helix
**Booth: 320**
**Web:** www.ehelix.com
Helix designs and manufactures the world's most power-dense, compact electric powertrains. Critical to aerospace, high torque and power density, efficiency, robustness and reliability are all central to the Helix motor philosophy. Already active in the sector, Helix ensures aerospace customers straightforward access to proven, world-class technology.

## I

### Intertek
**Booth: 670**
**Web:** www.intertek.com
Intertek Transportation Technologies in Milton Keynes, UK, has over 30 years of experience in the transportation industry and is one of the largest independent EV powertrain testing providers in the UK. Intertek offers testing for aerospace, EVs and hybrids, EV fluids, transmission systems, engines, emissions, fuels and lubricants and more.

### ITK Engineering GmbH
**Booth: 500**
**Web:** www.itk-engineering.de/en
Anything is possible, from embedded systems to cloud computing and artificial intelligence. Bosch Aviation Technology's tech partner, ITK Engineering, an innovative force in digital engineering, draws on methods-driven expertise to provide platform-independent software and system development services. ITK Engineering – digital engineering at its best!

## N

### NLR
**Booth: 230**
**Web:** www.nlr.org
The Royal Netherlands Aerospace Centre (NLR) is an applied research organization that bridges the gap between fundamental research and practical applications. To contribute toward the climate neutrality of the aviation sector, an important part of its research focuses on (hybrid) electric and hydrogen propulsion, and lightweight materials and structures for aircraft.

## O

### OPAL-RT Germany GmbH
**Booth: 270**
**Web:** www.opal-rt.com/de
OPAL-RT is a market leader in hardware-in-the-loop simulation of power electronics and electrical systems and has a vast variety of solutions for innovative controller testing. The solutions cover rapid control prototyping systems, HIL and power HIL systems for all kinds of aerospace applications.

## P

### Phase Motion Control SpA
**Booth: 110**
**Web:** www.phase.eu
Aviation is turning electric. Electric propulsion, with zero emissions, much-reduced maintenance and fuel costs and eVTOL capacity, will foster the urban air mobility revolution. PMC has been operating in this sector for several years with many projects including full electric, hybrid and e-fan, from advanced cargo eVTOLs to electric powertrains.

### PowerCell Group
**Booth: 300**
**Web:** powercellgroup.com
PowerCell's hydrogen fuel cell technology makes tomorrow's solutions available today, helping to create a fossil fuel-free world. PowerCell develops and produces fuel cell stacks and fuel cell systems with a uniquely high power density, for applications in aviation, marine, power generation and off- and on-road.

## Q

### Quadrant GmbH
**Booth: 220**
**Web:** www.quadrant.us
Providing exclusive magnetic products and services since 1992, Quadrant's drive is developing collaborative partnerships with its customers by providing exceptional products and services. Its portfolio of products, services and technologies solve customer challenges in demanding magnetic applications. Quadrant offers one-stop solutions – from design and prototyping to mass production.

## R

### Reaction Engines
**Booth: 140**
**Web:** www.reactionengines.co.uk
Reaction has developed groundbreaking thermal management technologies that provide a step change in performance, efficiency and sustainability across a range of industries including aerospace and electric vehicles. It is an innovator and disruptor; leveraging its technology to respond to the scientific and technical challenges posed by the net zero imperative.

### Rolls-Royce
**Booth: 400**
**Web:** www.rolls-royce.com/electrical
Rolls-Royce develops cutting-edge electric technology to power advanced air mobility – complete power and propulsion systems from power generation via power storage and distribution to electric motors for all-electric and hybrid-electric applications. Visit the Rolls-Royce booth to learn more about its portfolio for urban and regional air mobility.

## S

### Safran Electrical Power
**Booth: 200**
**Web:** www.safran-electrical-power.com
Safran is an international high-technology group. Its core purpose is to contribute to a safer, more sustainable world, where air transport is more environmentally friendly, comfortable and accessible. Safran has a global presence and holds – alone or in partnership – world or regional leadership positions in its core markets. www.safran-group.com

### Schubeler
**Booth: 440**
**Web:** www.schuebeler-jets.com
Schubeler is a leading expert in electric propulsion systems. For more than 25 years, Schubeler has pioneered the field of electric ducted fans, motors and compressors for industrial applications. Schubeler recently launched the eP05-21, the first electric propulsor designed specifically for eVTOL platforms.

### Speedgoat GmbH
**Booth: 540**
**Web:** www.speedgoat.com
Speedgoat provides customers in the aerospace and defense domains 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 is especially well suited for innovations towards electrification and automation.

## T

### Transense Technologies PLC
**Booth: 530**
**Web:** www.transense.co.uk
Transense Technologies develops and supplies world-leading sensor technology called SAWsense. This is a proven surface acoustic wave (SAW) sensor technology used in demanding applications to accurately and reliably measure torque, temperature, force and pressure to improve performance, efficiency and safety.

## U

### University of Nottingham
**Booth: 420**
**Web:** www.nottingham.ac.uk

## V

### Vacuumschmelze GmbH & Co. KG
**Booth: 350**
**Web:** www.vacuumschmelze.com
When it comes to high-performance motors, Vac has the whole package: profound knowledge, a century of experience and groundbreaking technology. From high-end magnetic alloys and permanent magnets to complete rotor and stator assemblies, Vac develops solutions for the ultimate empowerment of its customers' applications.

### Vector Informatik GmbH
**Booth: 330**
**Web:** www.vector-informatik.de

## A

### ABB AG
**Stand: 170**
**Web:** https://campaign-pa.abb.com/Test_Systems
Unsere Aufgabe ist es, unseren Kunden für Prüfstandssysteme als kompetenter Partner technologisch hochwertige Lösungen für leistungsfähige Antriebstechnik und Automatisierungsaufgaben mit PAISI2020 in kundenspezifischen und maßgeschneiderten Applikationen anzubieten. Damit schaffen wir die Basis für einen gemeinsamen nachhaltigen Geschäftserfolg. Besuchen Sie unseren Stand 170.

### AirBorn International Ltd
**Stand: 210**
**Web:** https://airborn.com
AirBorn entwickelt und fertigt robuste, hochzuverlässige Energiesysteme, die nicht ausfallen, in Umgebungen von –55 °C bis 105 °C arbeiten und den stärksten Stoß- und Vibrationsanforderungen standhalten. 100 % werkseitige ESS-Prüfprogramme sind für jede Leistung verfügbar.

### AKG Thermotechnik GmbH & Co. KG
**Stand: 550**
**Web:** https://www.akg-group.com
AKG ist seit über 100 Jahren einer der führenden Hersteller von Hochleistungs-Wärmetauschern und Kühlungs-Lösungen. Mit der Entwicklung und Herstellung von Kühlern für Flugzeuge, Hubschrauber und Triebwerke einschließlich elektrischer und hybrid-elektrischer Antriebe auf Basis von Batterien oder Wasserstoff ist AKG heute ein geschätzter Partner der Luftfahrtindustrie.

### Axter Aerospace
**Stand: 620**
**Web:** https://axteraerospace.com/
Axter ist spezialisiert auf die Entwicklung von Hybrid-/Elektroantrieben, Stromerzeugung und -verteilung sowie Batteriesystemen für Luft- und Raumfahrt und Verteidigung. Zu den proprietären Technologien gehören Elektromotor-/Generatorsteuerungen von 30 kW bis 1 MW, AC-DC- und DC-DC-Wandler und Batteriesysteme, einschließlich eines proprietären intelligenten BMS.

### Axyal Propulsion
**Stand: 130**
**Web:** https://www.axyal.com
Axyal, ein Teil der Magnax-Holdings, beschleunigt und fördert die Innovation von Luftfahrt-Antriebssystemen durch die Entwicklung und Zulassung von Axial-Flux Motoren inklusive optimierten Wechselrichterlösungen. Im Fokus liegt die Produktzulassung für die Luftfahrt benötigten Leistungsdichten, Effizienz und Zuverlässigkeit für elektrische Luftfahrtzeuge.

### Ayed-Engineering GmbH
**Stand: 125**
**Web:** https://www.ayed-engineering.com

## B

### Bosch General Aviation Technology GmbH
**Stand: 500**
**Web:** https://www.bosch-aviation.com
Bosch Aviation Technology ist ein Wegbereiter für eine nachhaltige Luftfahrt durch den Transfer von Automobiltechnik- und Fertigungslösungen in die Luft- und Raumfahrtindustrie. Bosch Aviation Technology ist bestrebt, tief in das etablierte Bosch-Automobilportfolio einzutauchen, um die perfekte Lösung für Ihre Bedürfnisse zu finden. Bitte wenden Sie sich an www.bosch-aviation.com.

### Bremen/Bremerhaven – City of Aerospace C/O Aviaspace Bremen eV
**Stand: 640**
**Web:** www.aviaspace-bremen.de/en
In der City of Aerospace im Bundesland Bremen treiben mehr als 140 Unternehmen und 20 wissenschaftliche Institute die Luft- und Raumfahrtindustrie an. Mit rund 12.000 Beschäftigten erwirtschaftet die Branche über 4 M€ pro Jahr. Das Land Bremen plant u.a. den Aufbau einer UAS-Leitstelle in Bremen.

## C

### Carpenter Electrification
**Stand: 310**
**Web:** https://www.carpenterelectrification.com
Carpenter Electrification ist ein führender Experte für weichmagnetische Legierungen und zeichnet sich durch 80 Jahre Erfahrung aus. Es konzentriert sich auf die Verbesserung von Elektrofahrzeugen, Flugzeugen, Drohnen und Robotik durch fortschrittliche Materialien für Motoren und Elektronik. Carpenter Electrification arbeitet mit Kunden zusammen, um Motoren mit hoher Leistungsdichte zu entwickeln und zu skalieren, wobei der vollelektrische Transport Vorrang hat.

### Carpenter Electrification
**Stand: 510**
**Web:** https://www.cav-systems.com
Fliegen Sie sicherer, weiter und umweltfreundlicher. CAV ist ein führender Anbieter von Eisschutz- und Luftwiderstandsreduzierungstechnologie. Wir sind auf kritische Sicherheitssysteme spezialisiert, die die Flugzeugeffizienz für die allgemeine und kommerzielle Luftfahrt sowie unbemannte und städtische Luftfahrzeuge erheblich steigern können.

### Cotesa GmbH
**Stand: 100**
**Web:** https://www.cotesa.de

## D

### DLR
**Stand: 160**
**Web:** https://www.dlr.de
Wir erforschen Brennstoffzellenantriebe für Luftfahrzeuge. In unserer Arbeit vereinen wir experimentelle und numerische Methoden, um kritische Betriebszustände und den Einfluss einzelner Komponenten auf das Antriebsystem zu analysieren. Hieraus leiten wir Entwicklungsempfehlungen für die Luftfahrtindustrie ab und tragen somit zur Verbesserung von Brennstoffzellenantrieben in Flugzeugen bei.

### Drive System Design Ltd
**Stand: 520**
**Web:** https://www.drivesystemdesign.com
Drive System Design ist ein preisgekröntes Ingenieurbüro, das sich auf die schnelle Entwicklung und Design elektrifizierter Antriebssysteme und zugehöriger Technologien spezialisiert hat. Das Unternehmen hat technische Zentren in Großbritannien und Nordamerika und kooperiert mit OEMs aus den Bereichen Automobil und Nutzfahrzeuge, Luft- und Raumfahrt, Verteidigungstechnologie, sowie Agrarwirtschaft und Bergbau.

### dSpace GmbH
**Stand: 340**
**Web:** https://www.dspace.com
Über dSPACE dSPACE ist einer der weltweit führenden Anbieter von Simulations- und Validierungslösungen, die bei der Entwicklung von vernetzten, selbstfahrenden und elektrisch angetriebenen Fahrzeugen eingesetzt werden. www.dspace.com

## E

### Electric & Hybrid Aerospace Technology Expo 2024
**Stand: 610**
**Web:** https://www.electricandhybridaerospacetechnology.com
Das Electric & Hybrid Aerospace Technology Symposium ist die führende Veranstaltung für hochrangige Luft- und Raumfahrtingenieure und -designer, führende Forschungsakademiker, Antriebsingenieure, Flugzeughersteller, Leiter des Designs und der Technik elektrischer Systeme und alle, die an der Entwicklung der Zukunft der Flugzeugtechnologie arbeiten. Buchen Sie jetzt Ihren Stand für 2024.

### Electric & Hybrid Aerospace Technology Symposium 2024
**Stand: 1111**

Das 2015 ins Leben gerufene Electric & Hybrid Aerospace Technology Symposium ist die führende Veranstaltung für hochrangige Luft- und Raumfahrtingenieure und -designer, führende Forschungsakademiker, Antriebsingenieure, Flugzeughersteller, Leiter des Designs und der Technik elektrischer Systeme sowie für alle, die an der Entwicklung der Zukunft der Flugzeugtechnologie arbeiten. Buchen Sie Ihren Stand für 2024.

### EN4 Srl
**Stand: 650**

**Web:** https://www.en4.it

EN4 entwickelt und liefert komplette Testlösungen für die eVTOL-Entwicklung. Das Team bedient Kunden effizient für einzelne Komponentenprüfungen oder komplette Prüflabore in einem einheitlichen Lieferprozess. Mit dem fortschrittlichen Know-how und der Flexibilität von EN4 ist es möglich, selbst die anspruchsvollsten Herausforderungen für die Fahrzeuge der Zukunft zu meistern.

### EN4 Srl
**Stand: 150**

**Web:** https://www.evolito.aero

Evolito ermöglicht kommerzielle Elektroflüge mit führender Antriebstechnologie für die Luftfahrt, inklusive Elektromotoren, Steuerungen und Batterien. Die innovative Axialflussmotor-Technologie wird erfolgreich eingesetzt, um die Anforderungen der Elektro- und Hybridluftfahrt zu erfüllen.

## F

### Fraunhofer Institut IISB
**Stand: 680**

**Web:** https://www.iisb.fraunhofer.de

Das Fraunhofer Institut für Integrierte Systeme und Bauelementetechnologie IISB in Erlangen ist spezialisiert auf Wide-Bandgap-Halbleiter und effiziente Leistungselektronik. Bauelemente-Knowhow verschmilzt hier mit komplexer Systementwicklung, vor allem für Elektromobilität und nachhaltige Energieversorgung. Mit seinen Lösungen setzt das Institut Maßstäbe in Sachen Energieeffizienz und Leistungsdichte, auch unter extremen Betriebsbedingungen.

## G

### Gamma Technologies GmbH
**Stand: 630**

**Web:** https://www.gtisoft.com

Gamma Technologies entwickelt und vertreibt GT-SUITE, eine führende multiphysikalische CAE-Simulationssoftware. GT-SUITE umfasst eine vollständige Bibliothek physikbasierter Modellierungsvorlagen, die den gesamten Entwicklungszyklus vom Konzept bis zur Validierung abdecken. GT-SUITE bietet einheitliche und hochmoderne Systemsimulationsfunktionen für elektrifizierte Fahrzeuge. www.gtisoft.com.

### GKN Aerospace Services Limited
**Stand: 410**

**Web:** https://www.gknaerospace.com

GKN Aerospace ist der weltweit führende Tier-1-Luftfahrtzulieferer und unterstützt Flugzeughersteller weltweit mit Aerostrukturen, Triebwerkssystemen und EWIS. GKN Aerospace setzt sich stark für Nachhaltigkeit ein und bietet leichte Verbundwerkstoffe, AM-, Elektrifizierungs- und Wasserstoffantriebssysteme, um Gewicht und Emissionen von Flugzeugen zu reduzieren. GKN Aerospace ist in 12 Ländern an 38 Standorten tätig.

### Glenair GmbH
**Stand: 120**

**Web:** https://www.glenair.de

Glenair ist ein führender Hersteller modernster Verbindungstechnologien. Das Unternehmen ist MIL-Spec-zertifiziert und bietet darüber hinaus kommerzielle Rund- und Rechtecksteckverbinder an. Alle Verbindungsdesigns sind in Umgebungs-, Filter-, hermetischen und Glasfaserkonfigurationen erhältlich. Verbindungstechnologien können entweder als einzelne Komponenten geliefert oder in schlüsselfertige Baugruppen integriert werden.

## H

### Harmonic Drive SE
**Stand: 260**

**Web:** https://www.harmonicdrive.de

Die Harmonic Drive SE Gruppe, ein jahrzehntelanger Pionier, liefert hochpräzise, spielfreie Getriebe und robuste Antriebe für die Luft- und Raumfahrt. Unsere Produkte sind langlebig, mit 40 wartungsfreien Jahren im Weltraum und über 30 zuverlässigen Jahren in Flugzeugtragflächen. Vertrauen Sie uns, wenn es um konstante Zuverlässigkeit und hochwertige Produkte geht.

### Helix
**Stand: 320**

**Web:** https://www.ehelix.com

Helix entwirft und produziert die weltweit leistungsdichtesten und kompaktesten elektrischen Antriebssysteme. Im Bereich der Luft- und Raumfahrt sind hohe Drehmomente, Leistungsdichte, Effizienz, Robustheit und Zuverlässigkeit zentral für die Motorenphilosophie von Helix. Als bereits aktiver Akteur in der Branche bietet Helix der Luft- und Raumfahrtindustrie unkomplizierten Zugang zu bewährter Spitzentechnologie.

## I

### Intertek
**Stand: 670**

**Web:** https://www.intertek.com

Intertek Transportation Technologies in Milton Keynes, Großbritannien, verfügt über mehr als 30 Jahre Erfahrung in der Transportbranche und ist einer der größten unabhängigen Anbieter von EV-Antriebstests in Großbritannien. Wir bieten Prüfungen für eAerospace, EVs & Hybride, EV-Flüssigkeiten, Getriebesysteme, Motoren, Emissionen, Kraft- und Schmierstoffe und mehr.

### ITK Engineering GmbH
**Stand: 500**

**Web:** https://www.itk-engineering.de/en/

Alles ist möglich, von eingebetteten Systemen über Cloud Computing bis hin zu künstlicher Intelligenz. Der Technologiepartner von Bosch Aviation Technology, ITK Engineering, eine innovative Kraft im digitalen Engineering, stützt sich auf methodengetriebenes Know-how, um plattformunabhängige Software- und Systementwicklungsdienstleistungen anzubieten. ITK Engineering – Digital Engineering vom Feinsten!

## N

### NLR
**Stand: 230**

**Web:** https://www.nlr.org

Das Royal Netherlands Aerospace Centre (NLR) ist eine Organisation für angewandte Forschung, die die Lücke zwischen Grundlagenforschung und praktischen Anwendungen schließt. Um zur Klimaneutralität der Luftfahrt beizutragen, konzentriert sich ein wichtiger Teil der Forschung auf (hybride) Elektro- und Wasserstoffantriebe sowie Leichtbaumaterialien und -strukturen für Flugzeuge.

## O

### OPAL-RT Germany GmbH
**Stand: 270**

**Web:** https://www.opal-rt.com/de

OPAL-RT ist ein Marktführer in der Hardware-in-the-Loop-Simulation von Leistungselektronik und elektrischen Systemen und verfügt über eine Vielzahl von Lösungen für innovative Reglertests. Die Lösungen umfassen Rapid-Control-Prototyping-Systeme, HIL- und Power-HIL-Systeme für alle Arten von Luft- und Raumfahrtanwendungen.

## P

### Phase Motion Control SpA
**Stand: 110**
**Web:** https://www.phase.eu
Die Luftfahrt wird elektrisch. Der elektrische Antrieb mit null Emissionen, stark reduzierten Wartungs- und Kraftstoffkosten und eVTOL-Kapazität wird die Revolution der städtischen Luftmobilität fördern. PMC ist seit mehreren Jahren in diesem Sektor mit vielen Projekten tätig, darunter vollelektrische, Hybrid- und E-Fans, von fortschrittlichen Cargo-eVTOLs bis hin zu Elektroantrieben.

### PowerCell Group
**Stand: 300**
**Web:** https://https://powercellgroup.com/
Die Wasserstoff-Brennstoffzellentechnologie von PowerCell macht die Lösungen von morgen schon heute verfügbar und trägt dazu bei, eine Welt ohne fossile Brennstoffe zu schaffen. PowerCell entwickelt und produziert Brennstoffzellenstacks und Brennstoffzellensysteme mit einer einzigartig hohen Leistungsdichte für Anwendungen in der Luftfahrt, Schifffahrt, Energieerzeugung sowie Off- und On-Road.

## Q

### Quadrant GmbH
**Stand: 220**
**Web:** https://www.quadrant.us
Quadrant bietet seit 1992 exklusive magnetische Produkte und Dienstleistungen und entwickelt Partnerschaften mit seinen Kunden, indem es außergewöhnliche Produkte und Dienstleistungen anbietet. Das Portfolio an Produkten, Dienstleistungen und Technologien löst Kundenherausforderungen bei anspruchsvollen magnetischen Anwendungen. Quadrant bietet Lösungen aus einer Hand – vom Design über das Prototyping bis hin zur Massenproduktion.

## R

### Reaction Engines
**Stand: 140**
**Web:** https://www.reactionengines.co.uk
Reaction hat bahnbrechende Wärmemanagementtechnologien entwickelt, die in einer Reihe von Branchen, einschließlich Luft- und Raumfahrt und Elektrofahrzeugen, einen grundlegenden Wandel in Bezug auf Leistung, Effizienz und Nachhaltigkeit bewirken. Es ist ein Innovator und Disruptor, der seine Technologie nutzt, um auf die wissenschaftlichen und technischen Herausforderungen zu reagieren, die sich aus dem Netto-Null-Imperativ ergeben.

### Rolls-Royce
**Stand: 400**
**Web:** https://www.rolls-royce.com/electrical
Rolls-Royce entwickelt innovative elektrische Antriebs- und Energiesysteme für Advanced Air Mobility - von der Stromerzeugung an Bord über Energiespeicherung und -verteilung bis hin zu Elektromotoren für voll- und hybridelektrische Anwendungen. Besuchen Sie unseren Stand, um uns und unser Portfolio für Urban Air Mobility und elektrischen Commuterflug näher kennenzulernen.

## S

### Safran Electrical Power
**Stand: 200**
**Web:** https://www.safran-electrical-power.com
Safran ist ein internationaler High-Tech-Konzern. Sein Hauptziel ist es, einen Beitrag zu einer sichereren und nachhaltigeren Welt zu leisten, in der der Luftverkehr umweltfreundlicher, komfortabler und leichter zugänglicher ist. Safran ist weltweit präsent und hält, allein oder in Partnerschaft, global oder regional führende Positionen in seinen Kernmärkten. www.safran-group.com

### Schuebeler Technologies
**Stand: 720**
**Web:** https://www.schuebeler-jets.com
Schübeler ist ein führender Experte für elektrische Antriebssysteme. Seit mehr als 25 Jahren leistet Schübeler Pionierarbeit auf dem Gebiet der elektrischen Impellerventilatoren, Motoren und Kompressoren für industrielle Anwendungen. Schübeler hat kürzlich den eP05-21 auf den Markt gebracht, den ersten Elektroantrieb, der speziell für eVTOL-Plattformen entwickelt wurde

### Speedgoat GmbH
**Stand: 540**
**Web:** http://www.speedgoat.com/
Speedgoat bietet Kunden in den Bereichen Luft- und Raumfahrt und Verteidigung die schnellste Möglichkeit, mit Simulink komplexe Steuerungen, DSP- und Bildverarbeitungsanwendungen mit Hardware zu entwickeln, zu prototypisieren und zu testen. Die modulare und leistungsstarke Architektur der Speedgoat-Zielrechner eignet sich besonders gut für Innovationen in Richtung Elektrifizierung und Automatisierung.

## T

### Transense Technologies PLC
**Stand: 530**
**Web:** https://www.transense.co.uk
Transense Technologies entwickelt und liefert die weltweit führende Sensortechnologie SAWsense. Dies ist eine bewährte Oberflächenwellen-Sensortechnologie (Surface Acoustic Wave, SAW), die in anspruchsvollen Anwendungen verwendet wird, um Drehmoment, Temperatur, Kraft und Druck genau und zuverlässig zu messen und um Leistung, Effizienz und Sicherheit zu verbessern.

## U

### University of Nottingham
**Stand: 420**
**Web:** https://www.nottingham.ac.uk

## V

### Vacuumschmelze GmbH & Co. KG
**Stand: 350**
**Web:** https://www.vacuumschmelze.com
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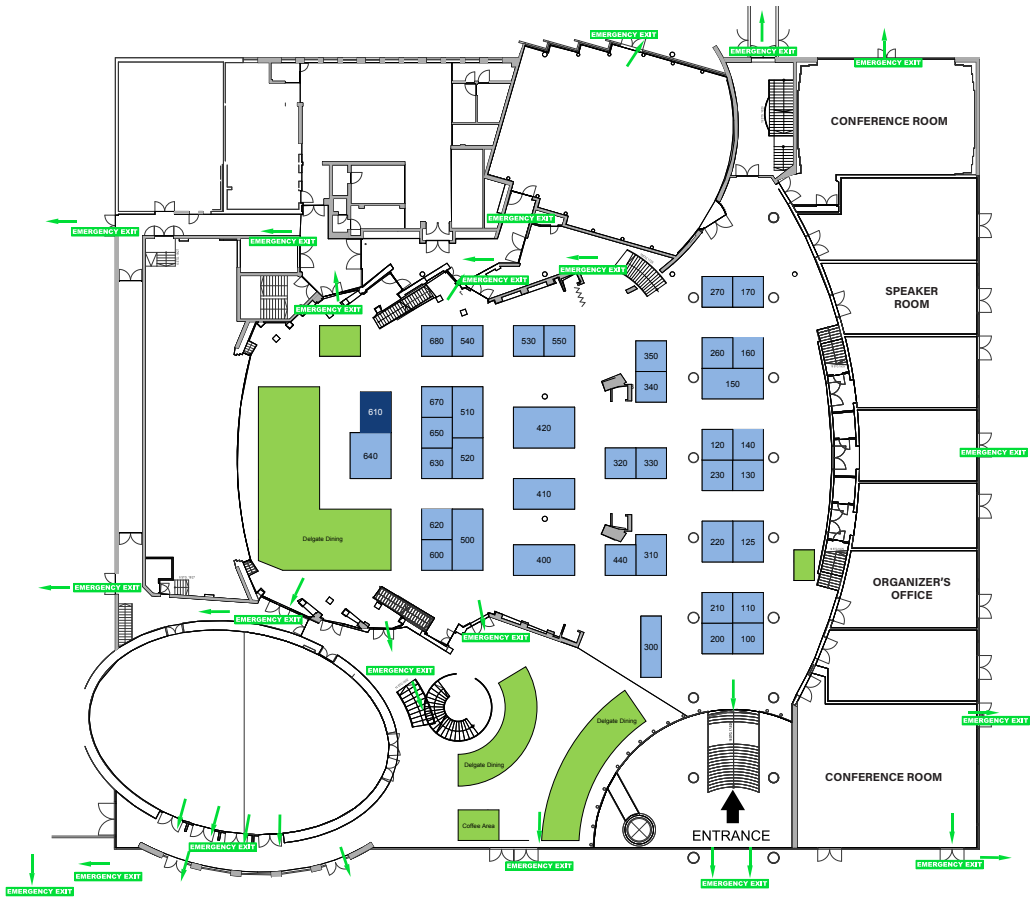

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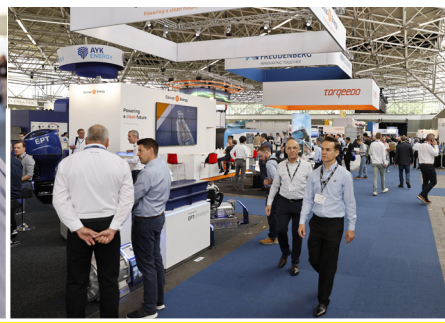

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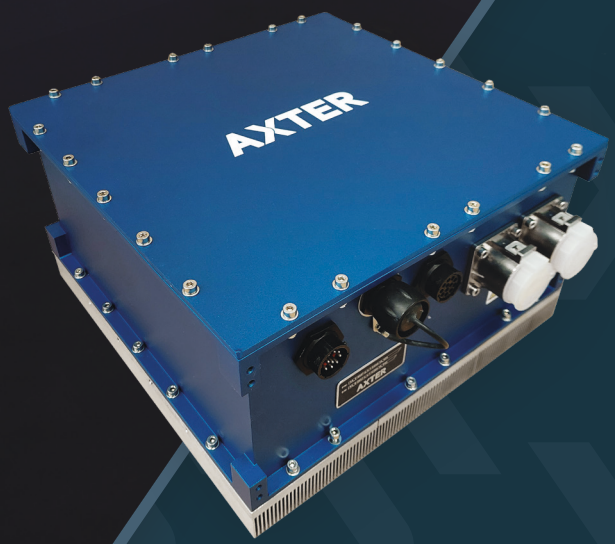



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