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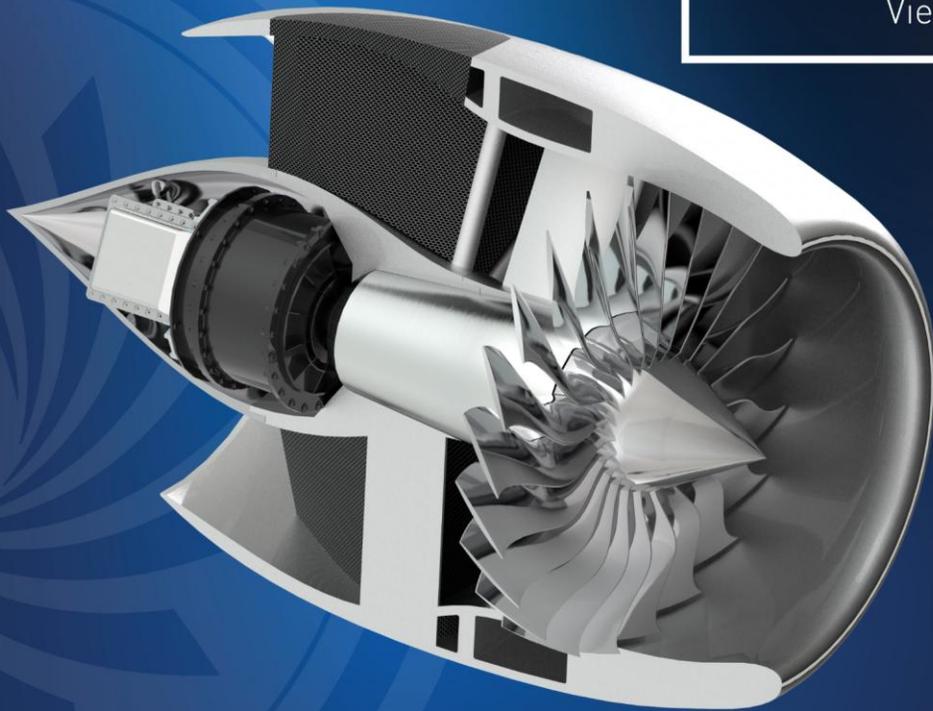
EXFAN

VIENNA AVIATION DAYS

2025

07-08 JULY

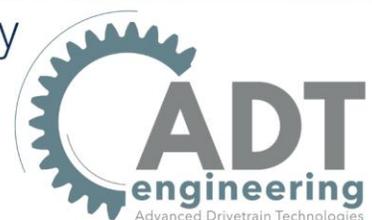
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Vienna, Austria



REPORT

FUTURE PROPULSION SYSTEMS
FROM TANK TO THRUST,
FROM RESEARCH
TO QUALIFICATION

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Funded by
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Published by:

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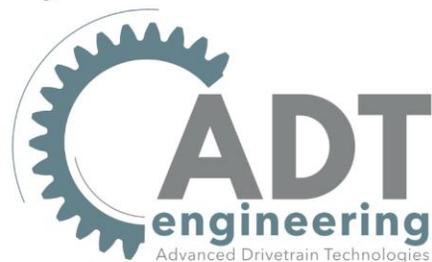
This report is a summary of the presentations held at the Vienna Aviation Days 2025.

Disclosure:

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VIENNA AVIATION DAYS 2025

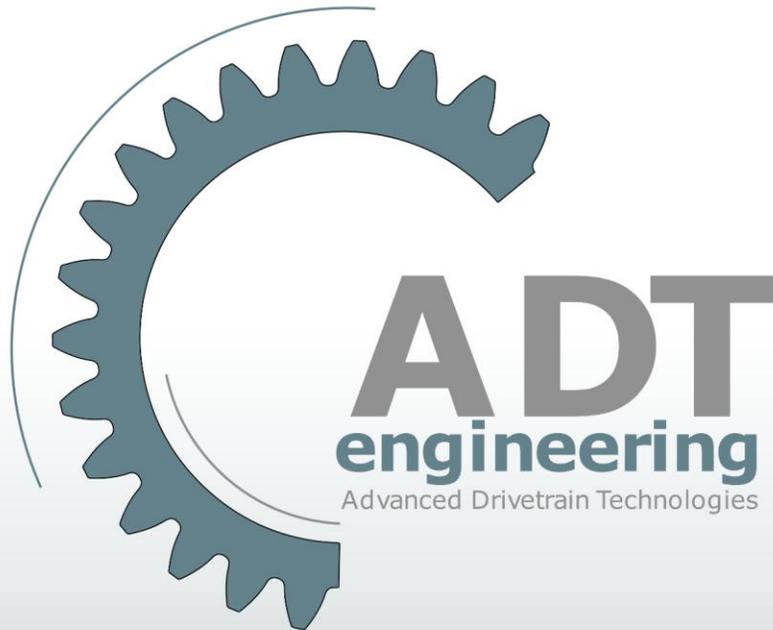
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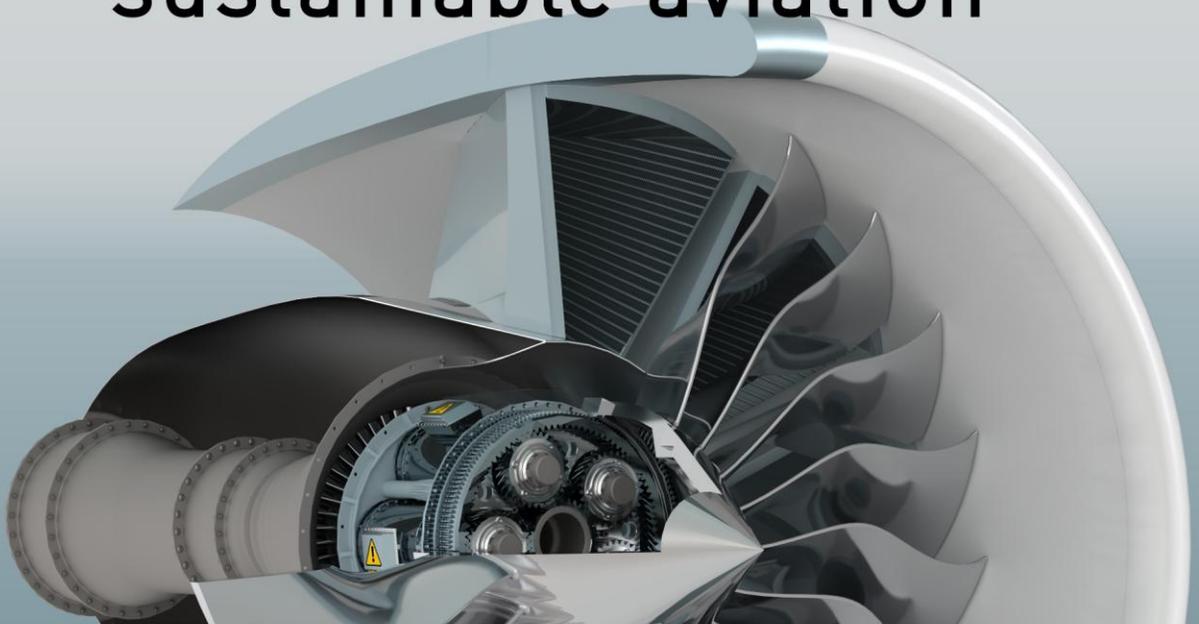
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Let us design the link
you need between
thrust and
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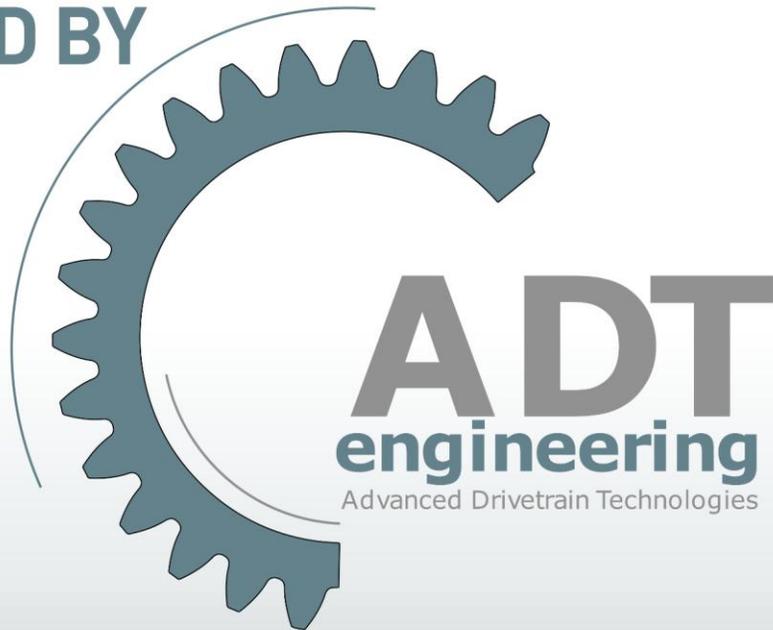


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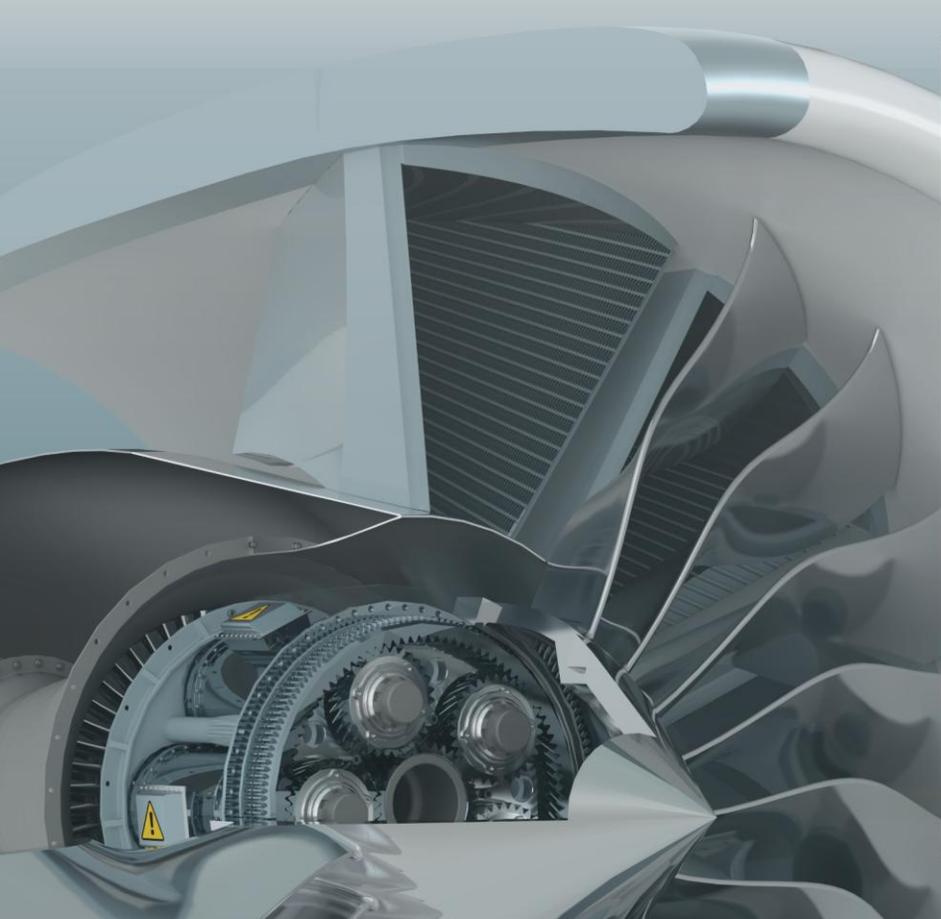
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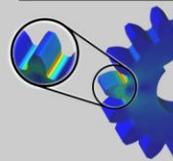
Advanced Drivetrain Technologies GmbH as engineering office provides the missing link between thrust and sustainable aviation by offering systems engineering, drivetrain design and Thermal Management for next-generation aviation powertrains.

The optimisation of gears for maximum efficiency, minimum mass and excellent NVH behavior is one of our core expertise. This is done with respect to the drivetrain system, your production capabilities and the certification aspects. The Thermal Management for drivetrains, its electronics and batteries is developed on a system level. Detailed solutions are designed according to your demand.

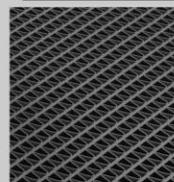
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VIENNA AVIATION DAYS 2025 – Executive Summary

On 7th and 8th of July 2025, the Vienna Aviation Days entered their second round – this time under the title ‘FUTURE PROPULSION SYSTEMS – FROM TANK TO THRUST, FROM RESEARCH TO QUALIFICATION’ and with contributions from over 20 leading experts in this fields. Over two eventful days, insights, technological advances and strategies were shared across the entire propulsion chain – from energy storage and fuel systems to thrust creation and system integration. At a time when sustainable solutions for aviation are needed more than ever, the goal was clear: to accelerate the path from research to qualification of innovative propulsion systems and to actively shape the future of climate-neutral aviation.

Vienna Aviation Days 2025 brought together representatives from research, industry and policy across numerous European countries.



The speakers of the Vienna Aviation Days 2025

*FUTURE PROPULSION SYSTEMS
FROM TANK TO THRUST,
FROM RESEARCH
TO QUALIFICATION*

“**The Horizon of Propulsion Systems**” showcased presentations of aviation industry high TRL developments that are already aiming towards certification. Conscious Aerospace showcased their Dash-8 hydrogen fuel cell retrofit and gave details about how the retrofitted aircraft is expected to operate within existing air traffic management and airport environments with minimal disruptions. A product that will be certified much sooner, the battery-electric eDA40, was presented by Diamond Aircraft. A particular focus was placed on the step ‘From Prototype to Certified Aircraft’. In order to enable the certification of the eDA40, new approaches have to be developed, such as displaying the battery capacity and ensuring that sufficient electrical energy is always available during the flight. As an enabling technology for both the fuel-cell Dash-8 retrofit as well as the battery electric eDA40, eMoSys presented their novel aircraft electric engine: A scalable machine from 100kW up to 2MW with a power density of 15kW/kg – surpassing currently certified electric machines with around 3kW/kg. While electric propulsion systems will be more present in the future, sustainable aviation fuels (SAF) offer the potential to reduce CO₂ emissions while using largely similar technologies to the current state of the art. TU Wien in cooperation with Austro Engine presented results obtained in the SAF Air Lab that was built based on a two-engine multi-purpose aircraft. This laboratory enables testing and measurements to be carried out under real-world test conditions and therefore provides deeper understanding on SAF in flight operations.

“The ClimAVTech Cluster” has the common goal of advancing climate friendly aviation through multiple technology paths from multifuel turbines over hybrid-electric engines, high and low-temperature fuel cells, hydrogen storage systems and new means of heat recuperation and thermal management. The Cluster consists of 15 Horizon Europe projects that presented their projects and recent results in a poster session.



Poster sessions of the ClimAvTech Cluster

“Beyond the Horizon of Propulsion Systems” focused on low-TRL research for technologies that aim to go into service beyond 2030. TU Graz in collaboration with Combustion Bay One presented a new combustion concept – the recursive sequential combustion – that will allow lower NOx and soot emissions than current technologies while being highly heat conservative and providing promising characteristics for both conventional fuels, SAFs and hydrogen. Technical ceramics, applied via 3D-printing were presented by TRIATHLON, as they have large potential for both hydrogen combustion engines as well as thermal management systems and recuperation: Such materials are insensitive to hydrogen embrittlement, show superior chemical stability and allow excellent surface finishes making them promising solutions for heat exchangers in future hydrogen combustion engines. Beyond the components of the propulsion system itself, it needs to be considered how new technologies can be integrated in the airframe: INDIGO presented their results of an aircraft optimization campaign leading to a baseline aircraft with 10 propulsors distributed along the wing. This aircraft shows the potential for similar missions and payloads as an A320neo to reduce block fuel by >30% and reduce noise by 6 dB.

“Surface Technologies – Macroscopic challenges, microscopic solutions” was this year’s special session. It showcased different surface technologies and how they are currently applied and can be used for future aircraft development. The coordinator of Horizon Europe project exFan CIDETEC presented an overview of surface treatments: cross-linked omniphobic coatings to reduce surface contamination, E-coatings for landing gears, diamond like coatings for aviation gearboxes, hydrogen barrier coatings to avoid embrittlement and surface polishing and coating techniques that have been developed for the exFan project. RHP Technology showed their plasma powder deposition process for aviation heating elements, embedded circuits and anti-icing coatings. The Politecnico Milano presented their progress with using cold-spray technologies to repair aluminium components and to combine multiple materials to create unprecedented material properties. Finally, Bionic Surface Technologies presented their patented riblet technology for aircraft drag reduction that has been applied already in 2019 to a Boeing 747 aircraft, yielding a confirmed 0.8% drag reduction that equals 160.000€ in annual cost savings for one Boeing 747-400.



Expert audience and some impressions of the Vienna Aviation Days 2025 during the speaker sessions

The sessions inspire, but the conversations in between shape future collaboration with the help of snacks!



“From Lab to Air” was the final session of the Vienna Aviation Days that discussed tools to reduce development time of aircraft and the policy necessary to enable research and development to achieve climate neutrality. In the first block, TEST-FUCHS and MAGNA Steyr Aerospace analysed how traditional project management strategies are not applicable for disruptive aviation technology. Based on their experience in developing hydrogen products, they described an agile project management approach which is suitable for an environment in which requirements and specifications have large gaps. Another tool to reduce development time of aircraft in the form of wind tunnel testing was presented by Rail Tec Arsenal: Their climatic wind tunnel allows full-scale engine tests, snow, rain and ground icing tests, cloud simulation with inflight icing and tests on components under extreme climatic conditions. This allows to test critical components of future aircraft early in the development cycle for a more successful flight test of the whole system. Besides the required technologies and methodologies, efficient international cooperation is a cornerstone of climate neutral flight. The project AREANA, consisting of multiple national funding agencies across Europe, aims at improving and coordinating European aviation research funding and programmes to foster a more sustainable, competitive aviation future and support synergies across EU, national, and regional research efforts. This effort has led to joint calls that allow trans-national collaboration in aviation.

The closing panel discussion with representatives from the Austrian Federal Ministry – Division for Space Affairs and Aviation Technologies – the German Federal Ministry – Division for Aviation – and the research institution DLR – Agency for Aviation Research – highlighted the central importance of synergies for successful collaboration. The discussion covered questions ranging from ‘What are the goals of your funding programmes?’ to ‘What are the next steps for your programmes?’ Once again, it was particularly highlighted that sustainable aviation needs to stay the main goal of all efforts.



*Panel discussion: Pathway from Lab to Air – policy and standardisation
(left to right) H. Amri (ADT), J. Kernstock (BMIMI), K. Wagner (BMW), H. Hagen (DLR)*

To finalize the Vienna Aviation Days 2025 a visit of the Rail Tec Arsenal was organized for the ClimAVTech Cluster and interested visitors. Thanks to Hermann Ferschitz, on the evening of the second day, the last remaining visitors were able to explore the enormous climatic wind tunnels that are used for full-scale rail, automotive and aviation testing. This was the finishing highlight and a fitting end for the Vienna Aviation Days 2025!



Parts of the ClimAVTech Cluster at the Rail Tec Arsenal hosted by Hermann Ferschitz

The proceedings of the Vienna Aviation Days will be available via Springer in Q1 of 2026 as part of the LNME series under the title “**Future Aviation Propulsion Systems: From Tank to Thrust, from Research to Qualification** “. This book will contain peer reviewed articles presented at the Vienna Aviation Days, giving more detail, tools and insight from industry and academia to the readers.

The abstracts presented in the following sections correspond to full papers that will be published in the book:





exFan is an EU funded collaborative research project set out to devise a novel heat dissipation and recovery system within a high-powered electric fan propulsion system driven by fuel cell technology. Central to this objective is the incorporation of a ducted heat exchanger (HX) within the propulsion system's nacelle. It will use the "Meredith effect" (ME) incorporating the ram jet effect to generate thrust from waste heat. The breakthrough innovations proposed in exFan will: allow aircraft manufacturers to offer savings in operation costs, enable European aeronautics industry to maintain global competitiveness and leadership, create significant contribution in the path towards CO and NOX emission free aircraft, investigate how the heat propulsor can be integrated within a hydrogen-electric propulsion system, advancing it to Technology Readiness Level 3 (TRL 3)

Project Coordinator **cidetec**
surface engineering

Technical Coordinator



Research Coordinator



Project Partners



THE TOPICS

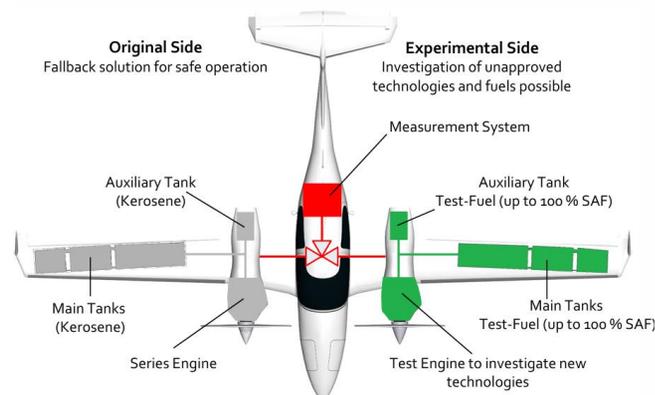
Session I: The Horizon of Propulsion Systems	8
Concept of Operations for Hydrogen Electric Aircraft	9
Diamond eDA40: From Prototype to Certified Aircraft – Overcoming Certification Challenges	9
Modular Concepts for High-Performance MW Electric Machines	9
Use of Sustainable Aviation Fuels (SAF) in General Aviation	9
Session II: Climate Friendly Aviation Technologies	11
Design of a multi-state hydrogen storage system centered around Cryo compressed storage	17
Development of a Novel Extension of the TFM-LES Combustion Model for Multi-Fuel Kerosene-Hydrogen Aeronautical Burners	18
Session III: Beyond the Horizon of Propulsion Systems.....	20
Design of a Virtual Platform for Sustainable Aviation Fuel Compatibility Studies: HPC, Combustor, and HPT of a Medium-Range Aeroengine.....	21
Opportunities and Challenges of Technical Ceramics for Thermal Management in Aviation	23
Recursive sequential combustion.....	24
Multidisciplinary Optimization-Driven Integration of Airframe and Powertrain for Local Air Quality Improvement and Noise Reduction	24
Session IV: Surface Technologies - Macroscopic challenges, microscopic solutions	27
Surface Technology Applications in Future Aircraft	28
Riblet technology - How sharks make aircraft propulsion better!	28
Solving challenges for surface finishing of AM based Heat Exchangers	28
Cold Spray for improved repair solutions: Current status and future challenges	28
Plasma Powder deposition for large-format multimaterial components manufacturing	28
Session V: Pathway from Lab to Air - Policy and Standardisation.....	30
Hydrogen tanks – from development to product and how classic aviation project management methods reach their limits	31
Snow tests in climatic wind tunnel tests to accelerate aircraft development	31
AREANA – Towards an intensified international cooperation	31
Session V: Pathway from Lab to Air – Panel Discussion.....	33

Session I: The Horizon of Propulsion Systems

The year 2050 promises to be the start of truly climate neutral aviation. However, this ambitious long term goal requires disruptive activities in the present – and organizations that put demonstrators in the air.

The overarching goal is to prove technological feasibility, overcome certification challenges and scale currently available technologies to the required performance and application.

This session features insights from key players advancing near-term propulsion technologies. **Conscious Aerospace** presents their finalized ConOps for electric aircraft and its regulatory implications. **Diamond Aircraft** shares progress on the eDA40, focusing on architecture, certification, and industrialization. **eMoSys** showcases scalable electric motor designs up to 2 MW, including efficiency data and certification experience. **Austro Engine and TU Wien** report on SAF use in piston engines, presenting results from in-flight testing and fuel analysis.



**Session I:
The Horizon of
Systems of Propulsion**

Concept of Operations for Hydrogen Electric Aircraft

Bidin Sulejmanovic – Conscious Aerospace



Diamond eDA40: From Prototype to Certified Aircraft – Overcoming Certification Challenges

Maarten Frijling – Diamond Aircraft



Modular Concepts for High-Performance MW Electric Machines

Ferdinand Wolf – eMoSys



Use of Sustainable Aviation Fuels (SAF) in General Aviation

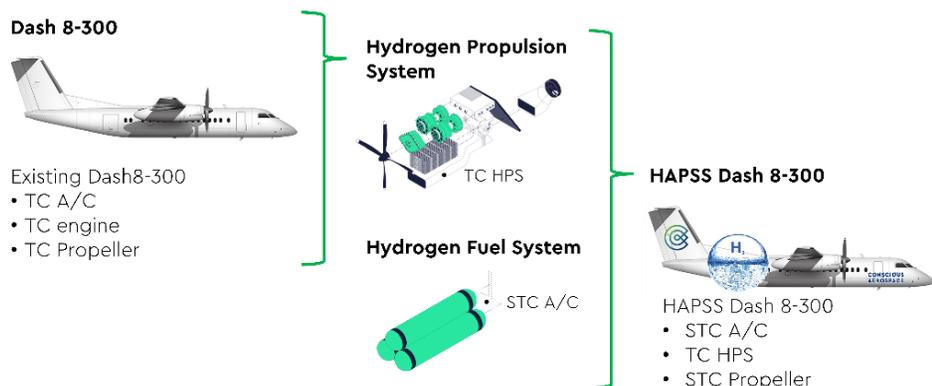
Juergen Schwarz & Florian Kleissner – Austro Engine & TU Wien



The aviation sector faces growing pressure to reduce its carbon emissions, but the pathway towards decarbonization remains technologically and operationally complex. Unlike other modes of transportation, aviation relies heavily on lightweight designs for efficient operation and on high-energy-density fuels to achieve long ranges and high payloads. In addition, strict certification standards lead to long development times. These characteristics make fast transitions towards lower emissions in this sector difficult. This abstract brings together four recent conference presentations of Session 1 at the Vienna Aviation Days 2025. Although the presented topics have different focus areas, they all point towards the same goal to enable a lower-emission future for aviation.

As part of the Hydrogen Aircraft Powertrain and Storage Systems (HAPSS) project, Conscious Aerospace is working on a hydrogen-electric version of a Dash 8-300 aircraft in the EASA CS-25 category. The goal is to integrate the retrofitted aircraft into the current air traffic system with only minor adjustments to flight operations which are related to the use of fuel cells and hydrogen as fuel.

The challenges associated with the usage of hydrogen in an aircraft are diverse but a lot of them are related to ground handling and the existing knowledge gap in this field. The task of refueling an aircraft can become



*Conscious Aerospace planned Dash8-300 Retrofit
(Source: Conscious Aerospace)*

complex when ground personnel and flight crews lack sufficient training and expertise in the safe handling of hydrogen.

Diamond aircraft demonstrated their progress on the Diamond eDA40 electric aircraft in the scope EASA CS 23 aircraft. The eDA40 is a fully battery-powered aircraft currently undergoing certification. The project shows not only the potential for electric flight but also focuses on the challenges in terms of certification when using batteries as energy source for aircraft. Specifically, redundancy aspects of battery usage in the eDA40 that ensure compliance with current certification standards.



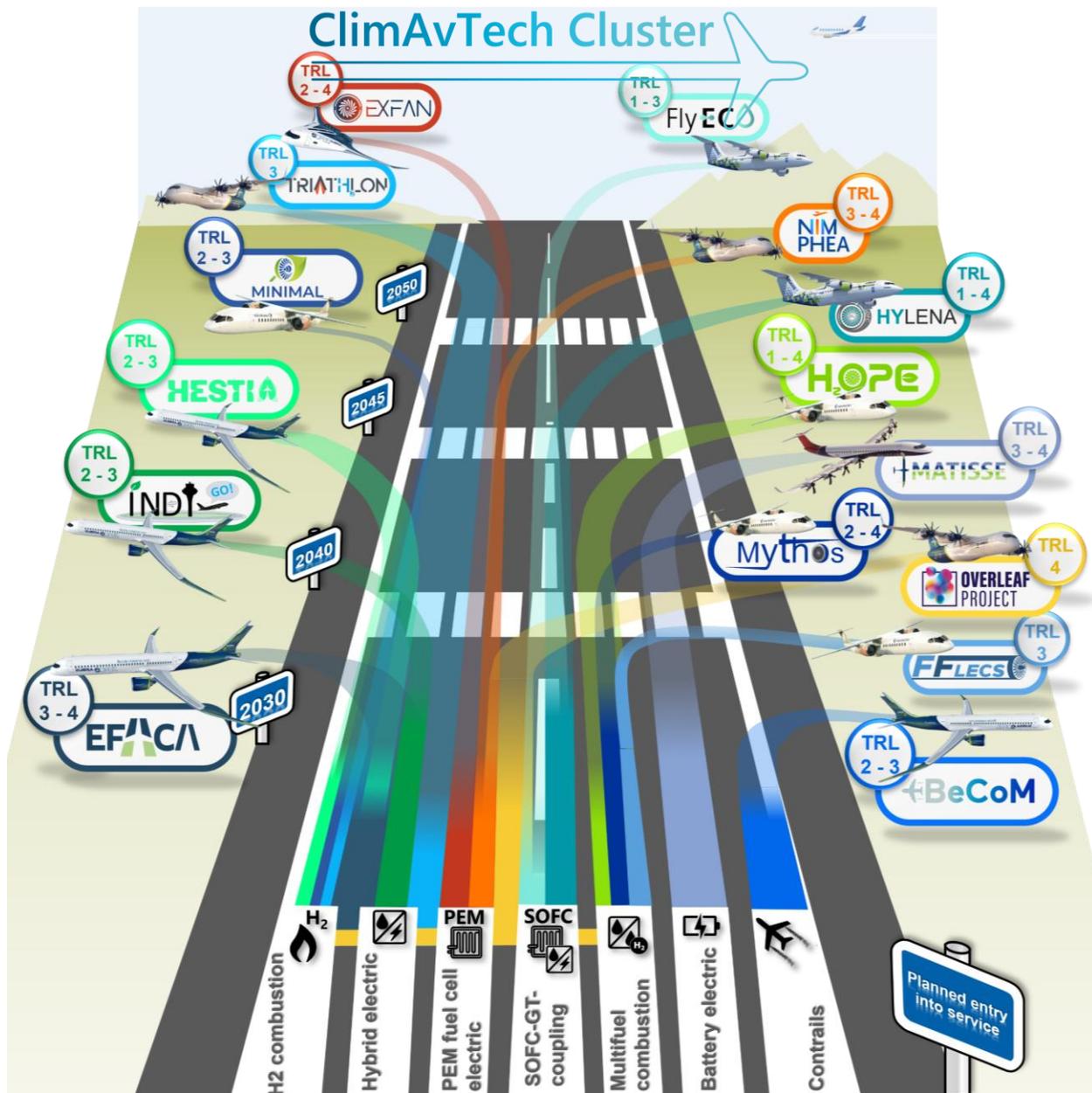
eDA40 in flight
(Source: Diamond Aircraft)

The company eMoSys, showed their recent development of a scalable electric motor intended for novel aircraft systems. The motor delivers its power at a high efficiency level close to the megawatt class, and due to the scalable design fits into different aircraft systems. The compact design of the motor is achieved due to the combination of the inverter and the motor in one housing that allows less cabling and overall results in an efficient and lightweight design with a tested power density of up to 15kW/kg and an efficiency exceeding 96%.

Austro Engine, in collaboration with TU Wien, presented the results of their experiments on sustainable aviation fuels (SAF) for piston-engine EASA CS-23 category. The project involved testing different fuel blends of Hydro processed Esters and Fatty Acids (HEFA) and kerosene combinations in their self-developed flying testbed. The flight tests demonstrated reductions in harmful emissions as nitrogen oxides (NO_x), carbon monoxide (CO) but also a reduction in carbon dioxide (CO₂) emissions. This work shows a feasible and fast method to reduce pollution for currently existing aircraft generations. These examples reveal that multiple parallel innovation paths are required to achieve the near- and long-term targets for emissions reduction in aviation. While sustainable aviation fuels offer a fast viable option, hydrogen and battery-electric systems present long-term opportunities in emission reduction but demand further research and regulatory work.

Session II: Climate Friendly Aviation Technologies

The ClimaAvTech Cluster currently brings together 15 research and innovation projects funded by the European Union that are working on the development of advanced sustainable aviation. The projects involved, which are shown in the following graphic and table, cooperate scientifically and carry out dissemination activities in order to improve the dissemination of their research results. The topics addressed include hydrogen-based propulsion systems, low-emission combustion systems, structural batteries and technologies for reducing contrails. The aim is to accelerate sustainable aviation solutions and promote their integration.



Overview of projects in the ClimaAvTech Cluster



Better Contrails Mitigation



HYdrogen eLEctrical Engine Novel Architecture



Environmentally Friendly Aviation for all Classes of Aircraft



Integration and Digital Demonstration of Low-emission Aircraft Technologies and Airport Operations



Novel recuperation system to maximize exergy from energy for fuel cell powered geared electric aircraft propulsion system



Multifunctional structures with quasi solid-state Li-ion battery cells and sensors for the next generation climate neutral aircraft



Novel Fuel-Flexible ultra-Low Emissions Combustion systems for Sustainable aviation



Minimum environmental impact ultra-efficient cores for aircraft propulsion



Future enabling technologies for hydrogen-powered Electrified aero engine for Clean aviation



Medium-range hybrid low-pollution flexi-fuel/hydrogen sustainable engine



Hydrogen combustion In Aero engines



Next generation of improved high temperature Membrane Electrode Assembly for aviation

Hydrogen Optimized multi-fuel Propulsion



system for clean and silent aircraft



novel low-pressure cryogenic liquid hydrogen storage for aviation



Thermodynamics-driven control management of hydrogen powered and electrified propulsion for aviation

Sustainable aviation fuels (SAFs) and hydrogen (H₂) are considered realistic ways to enable climate-neutral aviation. Since their physical and chemical properties differ significantly from Jet-A1, aircraft engines must be redesigned. This poses major technological challenges for the industry but also opens up opportunities for sustainable innovation. The **Mythos** (*Medium-range hybrid low-pollution flexi-fuel/hydrogen sustainable engine*) project is therefore pursuing a new approach. The goal is to develop a breakthrough design methodology based on reduced order models for engines and aircraft. This should shorten development times and enable new solutions to be implemented much more quickly – a key to the sustainable transformation of aviation.

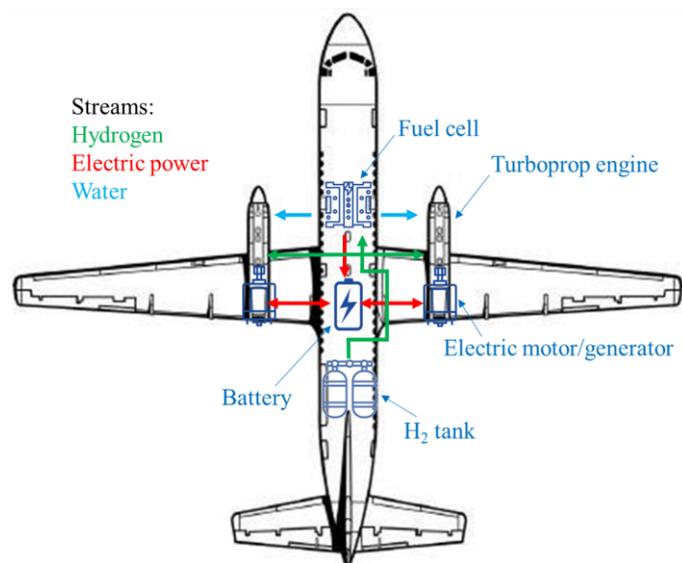
The project **HOPE** (*Hydrogen Optimised Multi-Fuel Propulsion System for Clean and Silent Aircraft*) has the goal to develop a kerosene-hydrogen multi-fuel hybrid system as a sustainable solution for aviation. The focus is on developing an engine concept that enables the optimal use of hydrogen while at the same time offering the highest possible environmental benefits. Aircraft in the A320/B737 class, with a planned market entry in 2035, serve as a reference. The key technologies of the HOPE multi-fuel-capable ultra-high-bypass turbofan engines, a fuel cell-based auxiliary power unit and a boundary layer ingestion propulsor at the rear. Flexible storage systems for kerosene/SAF and hydrogen are also being integrated. The result is an innovative overall system that combines efficiency, sustainability and noise reduction.

The project **FFLECS** (*novel Fuel-Flexible ultra-Low Emissions Combustion systems for Sustainable aviation*) addresses the development of novel combustion chamber technologies for future and fuel-flexible aircraft engines. The focus is on two innovative concepts for reducing NO_x and particulate emissions. The CHAIRlift concept uses low swirl lean lifted spray flames in a helical arrangement. In addition, the LEAFinnox concept is based on the principles of MILD combustion and promises uniform temperature distribution with minimal pollutant emissions. The evaluation and development of these technologies will enable a major step towards sustainable, low-emission aircraft engines.

The **HESTIA** (*HydrogEn combuSTion In Aero engines*) project is focusing on getting a basic understanding and control of key H₂ air combustion processes. It's all about ignition processes, combustion dynamics, flame stabilisation and turbulent combustion modelling, backed up by high-resolution simulations and canonical experiments. At the same time, injection systems are being developed – from incremental technologies to breakthrough approaches such as multi-point and jet-in-crossflow injection, low-swirl burners and strut injectors. Finally, a comprehensive evaluation of the specifications and operating characteristics under representative aircraft conditions is carried out. The comparison of different concepts enables an informed selection for future, efficient and environmentally friendly aircraft engine designs.

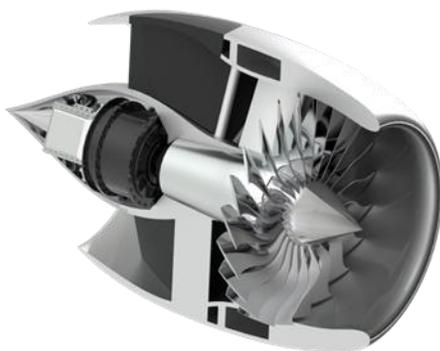
The **MINIMAL** (*Minimum environmental impact ultra-efficient cores for aircraft propulsion*) project aims to develop efficient and climate-friendly engine cores. Key results include the verification of climate-optimised composite cycle engines up to TRL 2, a low-NO_x hydrogen opposed-piston burner up to TRL 3 and an LH₂ intercooler at TRL 3. The opposed-piston burner uses innovative approaches such as hydrogen premixed charge compression ignition (PCCI), exhaust gas recirculation (EGR) and steam injection, supplemented by variable compression ratios. This enables a reduction in emissions while increasing efficiency – a significant step towards sustainable aviation.

The **TRIATHLON** (*Thermodynamics-driven control management of hydrogen-powered and electrified propulsion for aviation*) project focuses on researching hydrogen-powered hybrid electric drives in the megawatt class. The aim is to research technologies for low-maintenance, low-emission and highly reactive propulsion systems based on a combination of gas turbines and fuel cells. HT-PEM fuel cells are used for improved heat dissipation, water is recovered from the reaction products and fed into a 100% H₂ RQL trapped vortex burner. In addition, various storage forms such as cryo-compressed hydrogen, LH₂ and GH₂ are combined. Heat recovery is optimised by 3D-printed technical ceramics. A dynamic assessment of the technologies is carried out over the entire virtual flight cycle.



*Concept of the project TRIATHLON
(Source: TRIATHLON)*

The project **exFan** (*Novel Recuperation System to Maximize Exergy from Anergy for Fuel Cell Powered Geared Electric Aircraft Propulsion System*) is an EU-funded research project aimed at developing a novel heat dissipation and recovery system in a powerful, fuel cell-powered electric fan propulsion system.



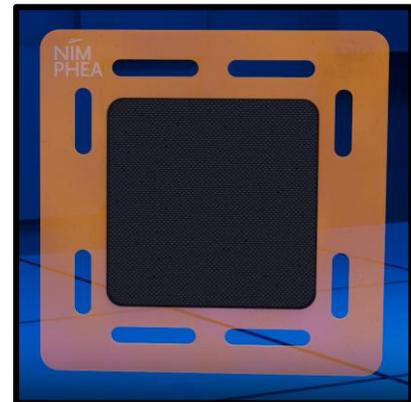
*Concept of the Fuel Cell Powered Geared Electric Aircraft Propulsion System of the project exFan
(Source: exFan)*

The central element is the integration of a ducted heat exchanger (HX) into the propulsion system's nacelle, which uses the Meredith effect to generate additional thrust from waste heat. This groundbreaking innovation is expected to reduce operating costs, secure the global competitiveness of the European aviation industry and make a decisive contribution to CO₂ and NO_x-free aircraft. In addition, research is being conducted into how such a 'heat propulsor' can be integrated into a hydrogen-electric propulsion system with the aim of further developing the technology to TRL 3.

The **FlyECO** (*Future enabling technologies for hydrogen-powered electrified aero engines for clean aviation*) project aims to significantly increase the overall efficiency of propulsion systems through hybridisation strategies. Key results include the provision of advanced simulation tools, validated methodologies and control approaches, as well as the elimination of CO₂ emissions and the reduction of NO_x emissions in aviation. Methodologically, a 1D SOFC performance model along the gas channel will be developed based on a validated 0D model, and thermodynamic gas turbine modelling will be performed for take-off and cruise conditions. The analyses will be carried out using

Turbomatch, a specialised software developed by Cranfield University. First results show approaches for future low-emission propulsion systems.

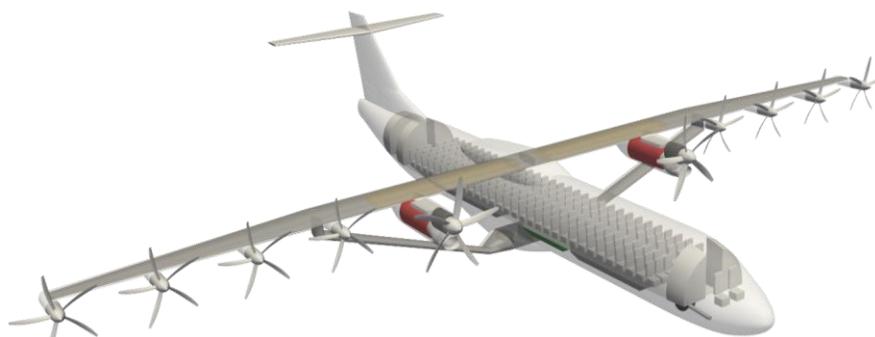
The **NIMPHEA** (*Next generation of Improved high temperature Membrane electrode assembly for aviation*) project focuses on developing a new generation of membrane electrode assemblies (MEA) – the central component of proton exchange membrane fuel cells (PEMFC) – specially adapted for use in aviation. An MEA consists of a gas diffusion layer, anode, membrane, cathode and catalyst layer. The innovations developed in the project represent a key technology for the future integration of fuel cells in aircraft. NIMPHEA is thus making a significant contribution to making aviation more sustainable.



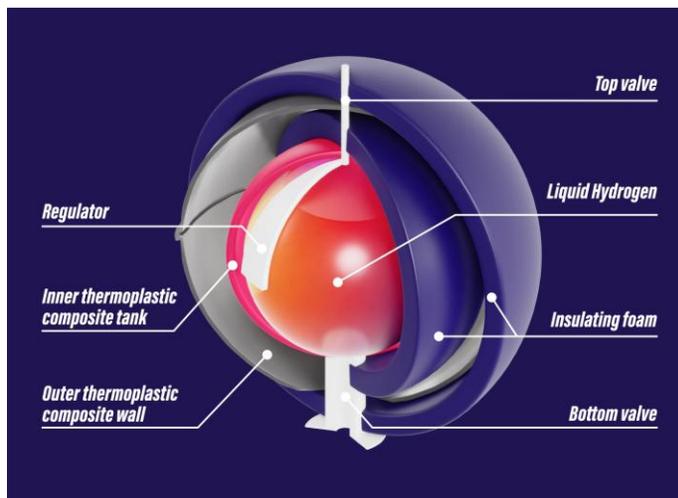
Next generation of Improved high temperature Membrane electrode assembly
(Source: NIMPHEA)

The **EFACA** (*Environmentally Friendly Aviation for all Classes of Aircraft*) project is researching and developing a hybrid turbo-electric propulsion system for propeller-driven regional aircraft, while also investigating fuel cell technologies with conventional and novel cooling systems. The aim is to conduct three TRL 3 demonstrations of relevant technologies for green aviation. Four aircraft classes are being considered: small, regional, single-aisle and twin-aisle aircraft, in addition to the first preliminary designs. Another focus is on the creation of a roadmap for achieving the EU's environmental targets in aviation. EFACA is thus making an important contribution to sustainable propulsion systems across all aircraft classes.

The **INDIGO** project (*INtegration and Digital demonstration of low-emission aircraft technologies and airport operations*) is developing transformative technologies for airport operations. The focus is on silent aircraft operations (NOISE) and improving local air quality (LAQ). Key technologies include large aspect ratio wings (LARW) to increase aerodynamic efficiency and synergy with distributed propulsion architecture. In addition, research is being conducted into distributed hybrid-electric propulsion (DHEP), which not only significantly reduces noise but also enables pollutant emissions to be reduced below 900 m flight altitude thanks to a parallel-serial hybrid electric propulsion system. INDIGO is in this way making an important step towards sustainable airport and aircraft operations.



Aircraft concept of the project INDIGO
(Source: INDIGO)



Concept for the hydrogen storage of the project OVERLEAF
(Source: OVERLEAF)

The **OVERLEAF** (*nOVel low-prEssure cRyogenic Liquid hydrogEn storAge For aviation*) project aims to develop a disruptive low-pressure liquid hydrogen storage system (LPH) for aviation. It is based on a combination of innovative functional and high-performance materials, highly efficient thermal insulation materials and novel sensors for hydrogen leak detection. This novel storage system is not only intended to increase safety and efficiency, but also to make a decisive contribution to the sustainability of future aircraft propulsion systems. OVERLEAF thus addresses a key technology for the transition to climate-neutral aviation.

The project **MATISSE** (*Multifunctional structures with quasi solid-state Li-ion battery cells and sensors for the next generation climate neutral aircraft*) is investigating intelligent, multifunctional structures for use in hybrid-electric aircraft. The aim is to develop smart structural battery technology that can store energy, manage energy and monitor safety functions. A demonstrator with a multifunctional structure is to be installed on the Pipistrel Velis Electro. The technologies will include energy storage, sensor technology and monitoring, as well as smart multifunctional aero composites. MATISSE is thus making a significant contribution to the development of climate-neutral, electrified aircraft of the next generation.

The **BeCoM** (*Better Contrail Mitigation*) project is aiming to significantly reduce the climate impact of contrails. Contrail cirrus clouds contribute to around 50% of the total effective radiative forcing of aviation. A key challenge is the inaccurate prediction of ice supersaturation by numerical weather prediction (NWP) models, which is why improvements are necessary. BeCoM is developing AI-algorithms for contrail detection and testing operational measures for contrail mitigation. The goal is to improve ice supersaturation forecasts, enabling targeted interventions in flight operations and thus reducing the climate impact of contrails.

Design of a multi-state hydrogen storage system centered around Cryo compressed storage



Dante Raso - TU Delft

In aviation, fuel selection is highly constrained by the requirement of energy storage systems that combine high gravimetric and volumetric efficiency with reliable power delivery. In the transition towards net zero carbon emissions, hydrogen will play a significant role as an energy carrier in aviation. Unlike conventional fuels, the energy density of a hydrogen storage depends highly on the state at which hydrogen is being stored, as well as the structural components of the storage system. Liquid hydrogen (LH₂) offers high gravimetric and volumetric densities but requires complex peripheral equipment such as cryogenic pumps. On the other hand, high pressure gaseous hydrogen (CGH₂) is less complex to handle but has low energy densities. Cryo-compressed hydrogen (CCH₂) has the potential to reach higher storage density and supply pressurized hydrogen without the need for cryogenic pumps. The focus of this article is the question of whether a multi-state H₂ storage architecture, which combines the aforementioned storage states, can leverage thermodynamic synergies to realize the unique boundary conditions that arise in aircraft operation. As part of the EU research project TRIATHLON, the H₂-specific powertrain of an aircraft, from the hydrogen storage to the gas turbine or fuel cell, is being analyzed primarily from a thermodynamic perspective. In a sub-project, the mechanical, thermal, media and thermodynamic boundary conditions for the tank system with the possibility of combining LH₂, CCH₂ and CGH₂ are being investigated and initial approaches for a full-composite storage system for CCH₂ are being developed. The full paper to be published in the conference proceedings uses a reference flight cycle and aircraft to determine a mission profile, range and powerplant capabilities, from which the required power is derived. These define the boundary conditions, such as the transient mechanical and thermal loads expected during the aircraft's mission. Based on these parameters and the available heat input, a sizing tool is presented that enables the design of the storage system architecture and tank geometry. The requirements for a full-composite CCH₂ tank are analyzed and a generic design is defined, based on this. Finally, for the reference flight mission and the resulting CCH₂ storage system, the power to be delivered and the heat required over the flight cycle are analyzed and graphically illustrated.

Development of a Novel Extension of the TFM-LES Combustion Model for Multi-Fuel Kerosene-Hydrogen Aeronautical Burners

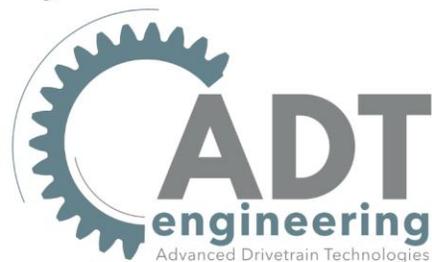


Lorenzo Palanti – Ergon Research

The ongoing transition towards carbon-neutral aviation has triggered extensive research and development efforts into alternative fuels, with hydrogen emerging as a promising candidate due to its direct zero-carbon emissions. However, 100% hydrogen combustion poses several operational challenges, even in ground-based gas turbine applications, including flashback risk, thermoacoustic instabilities, and bulky storage for long-haul aircraft. In response, multi-fuel combustion strategies, simultaneously burning liquid kerosene and gaseous hydrogen, are gaining traction across both industrial initiatives and European R&D projects. These approaches aim at mitigating the drawbacks associated with pure hydrogen combustion, while enhancing kerosene performance through improved flame stability at reduced equivalence ratios to reduce NO_x and soot production. This study, carried out in the context of the HOPE Horizon Europe project, presents the development and the preliminary validation of a novel extension of the Thickened Flame Model (TFM), tailored for simulations of multi-fuel kerosene-hydrogen combustion within a Large-Eddy Simulations (LES) framework. Before that, the standard TFM-LES setup available in ANSYS Fluent is validated against two 100% turbulent swirled hydrogen flames: the HYLON and APPU experimental burners, demonstrating strong predictive capabilities in pure hydrogen regimes. Subsequently, the model is extended to a multi-fuel context and preliminarily assessed against experimental data from the HOPE experimental test case, characterized by simultaneous kerosene-hydrogen injection and combustion. The results highlight the model's ability to capture the key characteristics of the studied multi-fuel system, thereby providing a fundamental step towards the CFD-based design and optimization of next-generation, low-emission aeronautical multi-fuel combustors.

VIENNA AVIATION DAYS 2025

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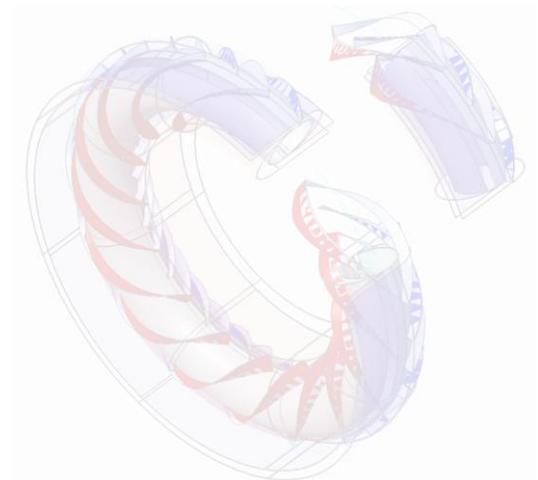
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Session III: Beyond the Horizon of Propulsion Systems

For future aircraft propulsion systems to be both **technologically and economically feasible**, great challenges need to be overcome. **“Beyond the Horizon of Propulsion Systems”** showcases research results in the field of climate neutral aviation, that aim to solve these challenges in a broad field between SAF & H2 combustion as well as electric aviation and make future aircraft lighter, more efficient and reduce emissions.



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de Madrid

Design of a Virtual Platform for Sustainable Aviation Fuel Compatibility Studies: HPC, Combustor, and HPT of a Medium-Range Aeroengine

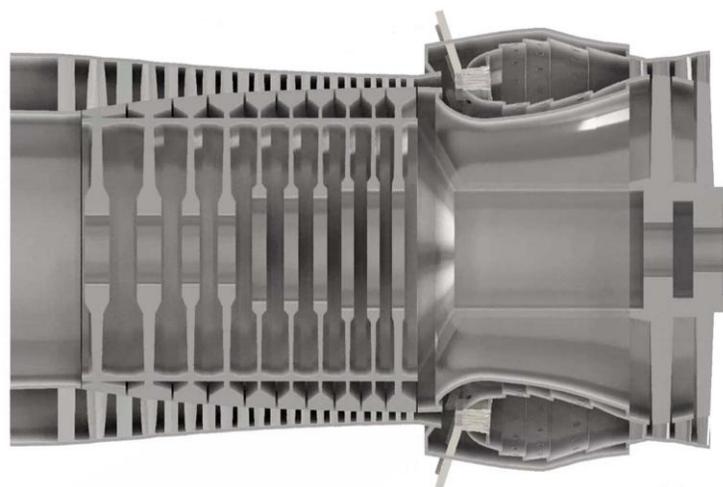
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Jan Donndorf – Ruhr-Universität Bochum

The transition to net-zero aviation calls for rapid and scalable solutions to reduce CO₂ emissions while maintaining the performance, reliability, and safety of modern aircraft engines. Given the long operational life of commercial aircraft—typically over 20 years, with many entering service today still active by 2050—and the need to avoid costly fleet replacements, incremental strategies compatible with existing fleets and fuel infrastructure, are essential in the short-to medium term. Among the most promising solutions, Sustainable Aviation Fuels (SAFs) offer the potential to significantly reduce the environmental impact of air transport through multiple benefits. First, lifecycle CO₂ emissions can be reduced by up to 80% compared to conventional jet fuels, depending on feedstock and production pathway. SAFs also contribute to lowering the formation of particulate matter (PM), which is closely linked to contrail-induced cloudiness—an effect that may exceed the climate impact of CO₂ emissions alone. In addition, SAFs lead to substantial improvements in local air quality through the reduction of sulphur oxides (SO_x) by up to 100%, and may enhance combustion efficiency due to their lower aromatic and sulphur content. Sustainable Aviation Fuels (SAFs) are derived from renewable resources such as waste oils, agricultural residues, or captured CO₂, and are certified under ASTM D7566 as drop-in fuels that can be blended with Jet-A and used in existing aircraft engines without requiring significant modifications. However, SAFs may differ significantly from conventional jet fuels in terms of chemical composition, volatility, viscosity, energy density, and thermophysical properties. These differences introduce several challenges from an engine design perspective. The lower or varying energy densities of SAFs can directly affect aircraft range and fuel consumption. Combustion mechanisms may deviate from those of Jet-A, with potential impacts on ignition behaviour and lean blowout limits, potentially requiring adjustments in fuel control systems and combustion chamber designs. Moreover, some SAFs exhibit different freezing points and cold-flow characteristics, which can lead to fuel gelling or poor atomization in low temperature environments. The altered physical properties of SAFs, including viscosity and surface tension, can affect spray atomization and droplet size distribution, which are critical for stable and efficient combustion. Any deviation in these spray characteristics may degrade engine efficiency or increase emissions. To mitigate such effects, fuel injectors and nozzles may need to be specifically optimized for SAF operation. In addition to these combustion related concerns, SAFs can also impact the thermal environment within the combustor. Shifts in the flame structure and temperature distribution can influence the formation of pollutants such as nitrogen oxides (NO_x) and carbon monoxide (CO). These effects are particularly critical in the high-pressure section of the engine, where small variations in fuel properties can lead to significant deviations in thermal loads, especially on the High Pressure Turbine (HPT), and altered emission profiles, with direct consequences on components durability and cooling requirements. Variations in the required cooling air may also affect the performance of the High Pressure Compressor (HPC), highlighting the strong interdependencies across the core components. The design and optimization of these subsystems for efficient operation with a wide range of SAFs can be significantly accelerated by digital tools capable of capturing complex thermo-fluid interactions across multiple fidelity levels.

In this work, we present the design of a virtual platform, including HPC, combustion chamber, and HPT, developed as one of the main tools within the MYTHOS project, for the high-fidelity numerical assessment of SAF compatibility in the core components of an aeroengine for a medium-range aircraft. The engine model is representative for a 100 kN thrust class twin-spool turbofan optimized for cruise performance and low emissions. A thermodynamic cycle model has been developed using EBSILON®Professional, providing performance predictions under cruise, take-off, and approach conditions for both Jet-A and selected SAFs. The model outputs global engine parameters, including thrust-specific fuel consumption and combustor inlet/outlet conditions, and serves as a basis for downstream 3D component design. The design of the combustion chamber is based on an annular Rich-Quench-Lean (RQL) layout featuring a scaled Triple Annular Research Swirler (TARS) injector. The thermodynamic requirements for the design are derived from the 0D model outputs at cruise and take-off conditions, and the geometry includes staged air injection and a film cooling strategy. High-fidelity CFD simulations of a single-sector, using both cold-flow URANS and reactive LES approaches, are then performed as a first verification step to assess compliance with the design objectives. The results confirm stable flame anchoring, effective mixing, and realistic CO and NO_x emission indices when compared to reference engines. The resulting temperature profiles at the combustor exit are also compatible with the expected inlet conditions of the high-pressure turbine. The aerodynamic design of the turbomachinery components is initiated using mean line analysis. Based on targets such as pressure ratio, corrected mass flow, and expected polytropic efficiency, key parameters—including stage loading, flow coefficient, degree of reaction, and velocity triangles—are determined and iteratively optimized. A preliminary CFD analysis confirms that the resulting 3D blade geometries meets the expected aerodynamic performance criteria, particularly for the highly sensitive HPC. Given its relevance within the scope of the project, the turbine design is complemented by a preliminary definition of a viable cooling strategy. This aspect will become central in future phases of the study, when analyzing the effects of switching from Jet-A1 to SAF exhaust gases. A representative model of the high-pressure core configuration is shown in the figure to the right.



Overview of the designed high pressure components

In the full paper to be published in the conference proceedings, we will present the methodology and workflow developed to perform a coupled CFD simulation of the three high-pressure components—HPC, combustor, and HPT. Particular attention will be given to the interface treatment and synchronization strategy required to couple a pressure-based solver (used for the combustor) with a density-based solver (used for the turbomachinery). This coupling approach aims to capture the full unsteady interactions across the high-pressure core, enabling realistic assessments of fuel sensitivity, thermal loads, and integrated performance under SAF operation.

Beyond SAF compatibility, the virtual platform is also intended to support exploratory studies on hydrogen combustion. Dedicated test cases will investigate to what extent modifications to the injection system and combustor design are required to accommodate hydrogen, whose distinct flame characteristics, reactivity, and diffusivity pose new design and integration challenges.

Opportunities and Challenges of Technical Ceramics for Thermal Management in Aviation



Lorenzo Mazzei – Ergon Research

The rapid evolution of hybrid-electric and hydrogen-powered aeronautical powertrain is substantially intensifying thermal management (TM) requirements, calling for innovative solutions to ensure system safety, performance, and reliability, also passing through the exploitation of innovative materials. Conventional metallic components, like Al-alloys and superalloys, while mature and widely adopted, face significant limitations, including elevated density, temperature constraints, or susceptibility to hydrogen embrittlement. This undermines their suitability for next-generation aerospace architectures, especially when dealing with very extreme temperature conditions, such as the cryogenic environment in the hydrogen storage or the hot environment of the gas turbine.

In this context, advanced technical ceramics emerge as promising alternatives for some applications, offering superior thermal stability, reduced weight, and chemical inertness. The TRIATHLON project, funded under the Horizon Europe framework, investigates the integration of 3D-printed technical ceramics for aerospace TM applications, with a focus on Lithography-based Ceramic Manufacturing (LCM) technology. This study provides a comprehensive comparative review of the thermomechanical and chemical properties of technical ceramics with respect to metallic alloys. In addition, it provides some preliminary estimations of the potential benefits achievable with innovative ceramic TM components designed with CFD simulations and printed with LCM. The results, which soon will be tested with a dedicated experimental campaign, aim to establish a foundational knowledge base and performance benchmarks to support the future redesign and the further technology maturation of critical TM components for more environmentally friendly aviation platforms.



Example for the 3D printed technical ceramics for hydrogen compatibility (Source: TRIATHLON, Ergon Research, Lithoz)

Recursive sequential combustion

Nina Paulitsch – Combustion Bay One & TU Graz



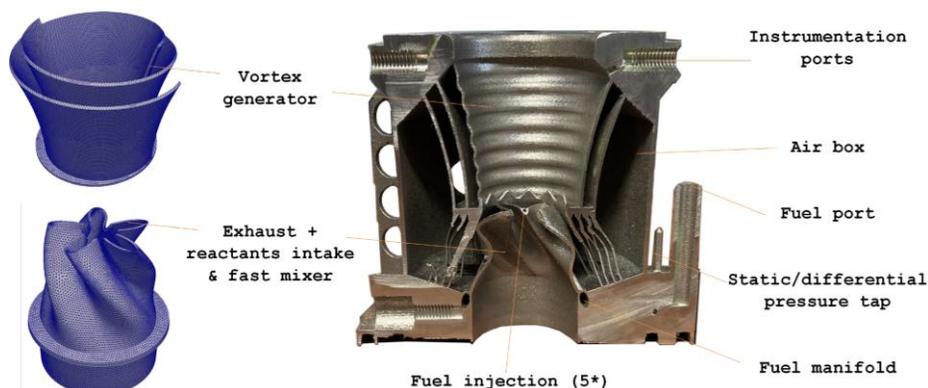
Recursive Sequential Combustion (RSC) is a robust, low-emission combustion concept that integrates lean pre-mixed combustion, burned gas recirculation, and sequential, diluted combustion. It offers significant reductions in NO_x and soot emissions while enhancing flame stability in the lean regime, positioning it as a promising candidate for implementation in future aeroengines.

Realising RSC in practical applications requires advanced burner architectures, such as the Constant Sector Recursive Sequential Combustor (CSRSC), capable of producing the complex flow interactions necessary for stable, low-emission operation. A critical aspect of such systems is the effective injection and mixing of fuel within the highly turbulent, swirling air flow. This is particularly challenging for hydrogen as a promising fuel of the future, due to its low density resulting in low-momentum jet behaviour. In the present study, the interaction between low-momentum jets and swirling air flow representative of CSRSC conditions is investigated with the aim of obtaining information on an optimised injector design for hydrogen combustion.

Non-reactive experiments were performed using Schlieren imaging to visualise the behaviour of low-momentum helium jets, employed as a surrogate for hydrogen due to their similar density and diffusivity. The momentum flux ratio was held constant to replicate hydrogen-like injection conditions. Different operating conditions were examined by varying the velocity ratio between the helium jet and the swirling air flow by (1) keeping the helium jet velocity constant and varying the air velocity, and (2) by keeping the air velocity constant and varying the helium jet velocity. Schlieren images were used to assess jet penetration and provide qualitative insights into mixing behaviour.

The results demonstrate that jet penetration and mixing are strongly influenced by swirl intensity and flow parameters. Increased air mass flow led to enhanced jet deflection and reduced penetration due to stronger swirl-induced entrainment.

These findings contribute to a deeper understanding of low-momentum fuel injection in highly swirling flows and support the development of stable, low-emission hydrogen combustion systems for future aeroengine applications.



Structure of the RSC Burner – DSC
(Source: Combustion Bay One, TU Graz)

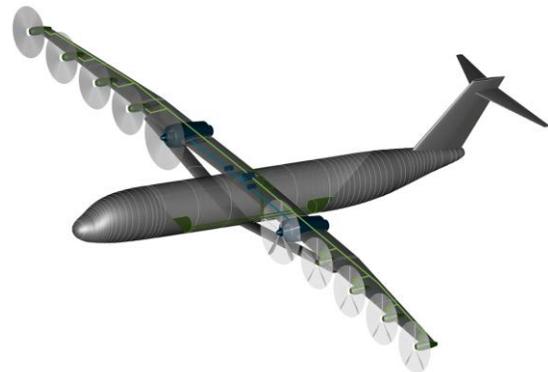
Multidisciplinary Optimization-Driven Integration of Airframe and Powertrain for Local Air Quality Improvement and Noise Reduction

Rauno Cavallaro – Universidad Carlos III



The INDIGO project, funded under Horizon Europe, investigates innovative airframe–propulsion concepts to reduce aviation’s environmental impact, with emphasis on improving local air quality (LAQ) and noise in airport vicinities. This study presents the conceptual design of a mid-range aircraft featuring Large Aspect Ratio Wings (LARW) combined with Distributed Hybrid Electric Propulsion (DHEP), assessed through a Multidisciplinary Design, Analysis, and Optimization (MDAO) framework.

The framework integrates aerodynamics, structural weight estimation, hybrid-electric powertrain modeling, and aeroacoustics into a unified optimization environment. Reduced-order aerodynamic models derived from vortex-lattice simulations are enhanced with flap and slipstream corrections. Structural regression methods provide weight estimates, while the powertrain module models a parallel–series hybrid system combining turboshaft engines with distributed electric propellers and batteries. Noise prediction is based on surrogate models trained with DLR’s IMMISplus tool.



*Baseline aircraft of the INDIGO-Project
(Source: INDIGO, Universidad Carlos III)*

The design mission includes climb, cruise, descent, diversion, and holding segments, along with takeoff and landing constraints. Five critical failure cases are incorporated, covering both thrust-loss and power-loss scenarios, to ensure compliance with airworthiness margins. Over 180 design variables are considered, spanning wing planform (aspect ratio, taper, twist), strut geometry, propeller layout, hybridization factors, and thrust distribution. Constraints enforce feasibility across all mission phases, addressing field lengths, climb gradients, battery state of charge, and propulsion limits.

The optimization campaign proceeded in two stages. An initial design-of-experiments mapped sensitivities of LAQ, noise, and fuel burn to key design drivers, revealing that prioritizing LAQ and noise leads to distinct solutions. A subsequent targeted optimization refined propeller configurations, accounting for multi-modality in the design space. From this process, an interim baseline configuration (IND1) was selected for its balanced environmental and operational performance.

Compared to an Airbus A320 reference, IND1 delivers significant gains: a 68% reduction in fuel burn below 900 m, directly reflecting improved near-airport emissions; an 11.5 dB reduction in effective perceived noise levels (EPNL) thanks to distributed propellers and hybrid-electric operation at low altitude; and a 30% decrease in block fuel consumption for a 1000 nm mission. These results highlight the effectiveness of MDO-driven integration of strut-braced wings and distributed propulsion in advancing both local and global sustainability metrics.

Beyond numerical improvements, this work illustrates the capability of MDAO frameworks to guide the design of unconventional aircraft. By embedding surrogate models, gradient-based optimization, and regulatory constraints into a unified environment, the framework enables systematic exploration of trade-offs between efficiency, noise, and emissions, supporting early-stage decisions that traditional sequential methods cannot capture.

Future research within INDIGO will focus on refining disciplinary models, extending robust optimization under uncertainty, and integrating pollutant concentration metrics to directly evaluate exposure in populated areas. Additional efforts will target aeroelastic modeling and load alleviation strategies, strengthening the link between airframe and propulsion design.

In summary, this study underscores the value of Multidisciplinary Design Optimization as a key enabler for sustainable aviation. The combination of strut-braced high-aspect ratio wings with distributed hybrid-electric propulsion achieves tangible reductions in emissions, noise, and fuel burn while meeting safety and performance requirements. The results confirm that MDO-based methods provide the essential integration platform for unlocking the potential of next-generation environmentally sustainable aircraft.

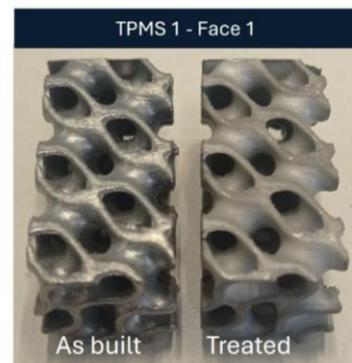
Acknowledgment: This work was conducted under the INDIGO project, funded by the European Union's Horizon Europe programme (Grant No. 10109605).

Session IV: Surface Technologies - Macroscopic challenges, microscopic solutions

Performance improvements with no weight penalty are an aviation engineers' dream. Surface technologies provide just that: **Laser-fabricated riblets** reduce aerodynamic drag in turbomachinery.

Cold spray repair offers a low-temperature method to restore worn propulsion components.

In thermal management, **electrochemical surface treatments** enhance heat exchanger performance. For composite components, **plasma powder deposition** enables reliable metallization, supporting conductivity. This block showcases how selected surface technologies can be applied to aircraft propulsion systems and how they will improve performance.



**Session IV:
Surface Technologies - Macroscopic
challenges, microscopic solutions**

Surface Technology Applications in Future Aircraft

Jaime Ochoa – CIDETEC Surface Engineering



Riblet technology - How sharks make aircraft propulsion better!

Andreas Flanschger – Bionic Surface Technologies



Solving challenges for surface finishing of AM based Heat Exchangers

M. Belén García Blanco – CIDETEC Surface Engineering



Cold Spray for improved repair solutions: Current status and future challenges

Mario Guagliano – Politecnico Di Milano



Plasma Powder deposition for large-format multimaterial components manufacturing

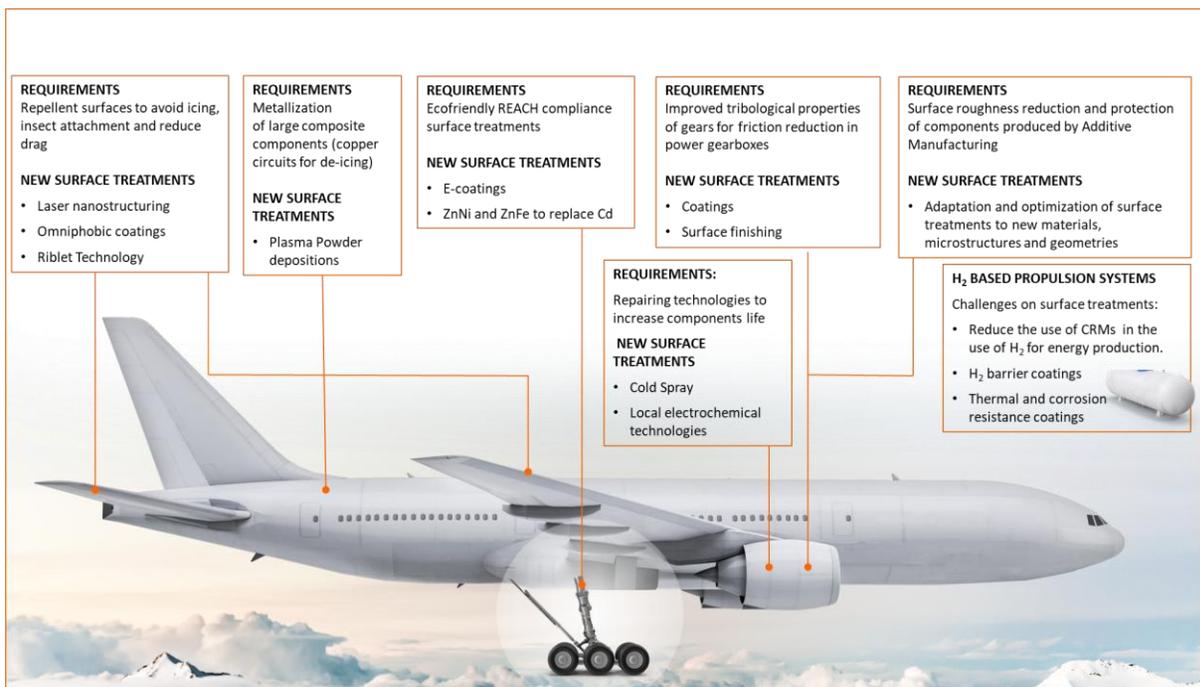
Carlos Belei – RHP Technology



In aerospace applications, surface treatments are essential for improving the durability and performance of components under harsh conditions. Common techniques include anodising for corrosion protection, thermal coatings for heat resistance, and surface hardening methods like nitriding and carburizing. Wear resistance is enhanced through chrome and nickel plating, while technical paints provide environmental protection. Additionally, shot peening improves fatigue resistance, and ceramic coatings offer thermal and electrical insulation. The increasing complexity of aerospace systems has led to a growing demand for advanced surface functionalities. This is the abstract for the full paper, that summarizes the findings of surface technologies in aerospace applications presented at the Vienna Aviation Days 2025.

One emerging requirement is the development of repellent surfaces capable of minimizing ice accretion, preventing insect adhesion, and reducing aerodynamic drag. To address these challenges, novel surface treatments such as laser nanostructuring, omniphobic coatings, and riblet technology are being investigated. These technologies offer promising potential for enhancing aerodynamic efficiency and improving operational safety under adverse environmental conditions. Environmental regulations, especially those related to REACH compliance, are increasingly driving the development of eco-friendly surface treatments. This includes, for instance, the adoption of anaphoretic e-coatings specifically formulated for aluminum alloys, as well as the replacement of cadmium-based coatings with less hazardous alternatives such as zinc-nickel and zinc-iron systems. These measures aim to reduce environmental impact without compromising performance standards. In power transmission systems, especially gearboxes, improving tribological performance is a priority to

minimize friction and wear. Advanced coatings such as DLC (Diamond-Like Carbon) and surface finishing techniques such as laser texturing and superfinishing are being applied to gear components to enhance their durability, efficiency, and overall lifespan under high-load operating conditions. Repair technologies are also gaining importance to extend the service life of high-value components. Innovative approaches such as cold spray and localized electrochemical techniques enable targeted repairs that restore functionality while minimising material loss and downtime. These treatments support the industry's shift toward more sustainable and cost-effective maintenance strategies. With the rise of additive manufacturing in aerospace, high surface roughness and material compatibility pose new challenges. The unique microstructures and geometries produced by additive techniques require tailored surface treatments. Current research focuses on adapting and optimising conventional methods to suit these new manufacturing paradigms, ensuring consistent performance and reliability. Finally, the transition to hydrogen-based propulsion systems introduces a new set of challenges for surface engineering. Key considerations include the reduction or elimination of critical raw materials (CRMs) in hydrogen-related components, the development of hydrogen barrier coatings to prevent diffusion and embrittlement, and the creation of coatings capable of withstanding extreme thermal and corrosive environments. These innovations will be essential for the safe and efficient deployment of next-generation propulsion technologies.



*Examples of emerging surface treatments for aircrafts
(Source: CIDETEC Surface Engineering)*

Session V: Pathway from Lab to Air - Policy and Standardisation

Finding disruptive technology building blocks to solve the problems of future aviation is not enough. The timelines set by policymakers are extremely ambitious, which requires close collaboration of all stakeholders and new strategies for project management. A significant challenge is the process of development, testing and certification of new technologies.

To solve this challenge, there is a need to rely on experienced partners and to provide testing facilities to accelerate the time to market of future sustainable aircraft. This block outlines the challenges and solutions related to **developing completely new technologies for aviation**, it showcases how **climatic wind tunnel tests accelerate aircraft development** and reduce costs and finally shows the **possibilities for collaboration in research and development** within Europe in a presentation and a panel discussion.



**Session V:
Pathway from Lab to Air - Policy
and Standardisation**

Hydrogen tanks – from development to product and how classic aviation project management methods reach their limits

Michael Schilling & Martin Stubenrauch – TEST-FUCHS & Magna Steyr Aerospace



Snow tests in climatic wind tunnel tests to accelerate aircraft development

Hermann Ferschitz – Rail Tec Arsenal



AREANA – Towards an intensified international cooperation

Polina Wilhelm – FFG



Policy strategies place ambitious goals on the developers of aircraft propulsion systems. In 2040 more than half of European airport departures are expected to be done by new, “green” aircraft. While most research focuses on solving the technical challenges for sustainable aircraft propulsion systems, additional challenges wait beyond the early TRLs. This abstract puts a spotlight on three of these challenges that have been presented at the Vienna Aviation Days 2025, that give unique insights into the workings of the aviation industry and will help researchers, scientists and engineers accelerate their developments and products through the TRLs.

Accelerate technology development through improved project management methodologies:

When developing new technologies, system specifications are usually unstable and conventional developing processes in large established companies have too little change management and over-conservatism, which exacerbates this issue. In this abstract, a general methodology for a required cultural shift in aerospace organizations is outlined, which allows for more agile development of new technologies based on the example of a liquid hydrogen tank.

Shortened development loops through early testing: When crucial aircraft components, such as new engines, are certified, safeguard measures against fatigue, foreign object ingestion, ice, rain and hail ingestion must be demonstrated. With the focus on icing, the benefits of having accurate icing wind tunnel tests and the progress to achieving realistic icing and snow conditions within the RTA Icing wind tunnel are presented. It is shown how the right application of early testing can lead to shorter development cycles and reduced cost.

Accelerate technology development through international cooperation: Disruptive aviation research is funded by regional, national and international funding programmes. Often, work is duplicated among these programmes which uses up funds and slows down the time until a technology can enter the market. This AREANA project will accelerate technology development and allow cooperation between researchers of different nations. At the end of 2025, the first International Call “JoinED Call” was launched as a result of AREANA by 7 funding organizations from 5 countries: Austria, Germany, the Netherlands, Romania and UK. More information can be found via <https://areanasynergies.eu/>.



*Rain and ice for commercial aircraft certification
(Source: Rail Tec Arsenal)*



*Overview of partners who takes part in the AREANA project
(Source: AREANA, FFG)*



Session V: Pathway from Lab to Air – Panel Discussion

Panel discussion

**Session V:
Pathway from Lab to
Air - Policy and
Standardisation**

Kai Wagner - BMW

Ingrid Kernstock - BMIMI

*Hartwig Hagen - DLR-PT, Projektträger
Luftfahrtforschung*

 Bundesministerium
für Wirtschaft
und Klimaschutz

 Bundesministerium
Innovation, Mobilität
und Infrastruktur

 Deutsches Zentrum
für Luft- und Raumfahrt
DLR

In the panel discussion with representatives from the Austrian Federal Ministry, the German Federal Ministry and the DLR, the importance of synergies for successful cooperation was highlighted.

The discussion covered a wide range of topics, from the objectives and priorities of the respective funding programmes to current challenges and the next planned actions. The synopsis below outlines the discussed questions and briefly summarizes the answers.



*Panel discussion: Pathway from Lab to Air – policy and standardisation
(From left to right) H. Amri (ADT), I. Kernstock (BMIMI), K. Wagner (BMW), H. Hagen (DLR)*

DISCLAIMER

The following summary is based on keywords and notes recorded during the panel discussion. It is intended to reflect the general themes and topics raised during the event, rather than verbatim statements or formally agreed positions. As such, the summary may contain inaccuracies, omissions, or interpretations that do not fully represent the views of all panelists or their respective organizations.

What are the goals of your funding programs?

Ingrid Kernstock, BMIMI, Division for Space Affairs and Aviation Technologies

Context of Take-Off:

- Drive progress towards national aviation strategy
- Improve climate friendliness
- Be at the forefront of aviation tech with supply industry
- Align with larger countries to achieve overarching goals

Kai Wagner, BMW, Division for Aviation

Context of LuFo:

- Support research in disruptive technologies
- Reduce air pollution and noise due to aviation
- Strengthen national competitiveness in aviation

Hartwig Hagen, DLR-PT, for the AREANA project

Context of AREANA:

- Foster cooperation between funding programmes
- Achieve a “Schengen environment” for research funding

How do you envision the journey of a project through TRLs and the corresponding funding possibilities?

Ingrid Kernstock, BMIMI, Division for Space Affairs and Aviation Technologies

Context of Austria:

- FWF, FFG & AWS support research
- Usually supports TRL1-6
- Specific budgets exist for experimental research
- If additional support is necessary, contact BMIMI directly

Kai Wagner, BMW, Division for Aviation

Context of Germany:

- Pre-competitive phase: LuFo with higher funding rates
- Higher TRLs supported by LED (loan system)
- For Demonstrators: EU Partnerships

Hartwig Hagen, DLR-PT, for the AREANA project

Context of AREANA:

- Enough tools exist, but flexible cooperation is required!

What strategies are in place to overcome the "valley of death" of TRL5+ how can this work on national/European level?

<p>Ingrid Kernstock, BMIMI, Division for Space Affairs and Aviation Technologies</p> <ul style="list-style-type: none"> • Partnerships like Clean Aviation • Austria prepares Industry Strategy → good opportunity to bring in ideas & proposals 	<p>Kai Wagner, BMW, Division for Aviation</p> <ul style="list-style-type: none"> • Valley of Death is problem for SMEs/Start Ups. • Higher funding rates to mitigate this • UpLift offers test infrastructure • StartUp Initiative helps with better access to capital 	<p>Hartwig Hagen, DLR-PT, for the AREANA project</p> <ul style="list-style-type: none"> • Huge amounts of money exist, but it is not available to many. • Going more European may be a solution to overcome TRL5+
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How do different funding opportunities overlap or interface with each other?

<p>Ingrid Kernstock, BMIMI, Division for Space Affairs and Aviation Technologies</p> <ul style="list-style-type: none"> • We have working groups with CA, SESAR • Opportunities are discussed in these groups • Bilateral talks with LuFo for cooperation 	<p>Kai Wagner, BMW, Division for Aviation</p> <ul style="list-style-type: none"> • Single Basic Act requires synergies with national programmes to be exploited • This was successful with MoUs with different regions • It needs to be a win-win situation between Partnerships and national programme 	<p>Hartwig Hagen, DLR-PT, for the AREANA project</p> <ul style="list-style-type: none"> • There is a lot of overlap in research projects within Europea • We need to start with talking about strategies and see who is where. Make them talk to each other.
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How important is sustainable Aviation at the moment?

Ingrid Kernstock, BMIMI, Division for Space Affairs and Aviation Technologies

- Sustainability is still important (competitiveness, climate & social)
- Kick-Off to cooperate in aviation with defense

Kai Wagner, BMW, Division for Aviation

- Climate change will continue to be a great challenge!
- ZeroE was postponed, but not dismissed
- Sustainable aviation will still be a focus of the funding programme.

Hartwig Hagen, DLR-PT, for the AREANA project

- Migration due to climate change will become a challenge → climate change is important
- At the same time, we need to protect peace

Will there be an interaction between defense & civil aviation funding?

Ingrid Kernstock, BMIMI, Division for Space Affairs and Aviation Technologies

- Interaction between defense & civil is planned but outcome not yet clear.
- There also needs to be budget for these activities

Kai Wagner, BMW, Division for Aviation

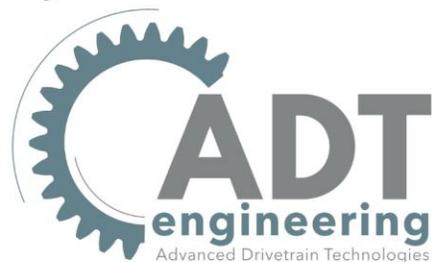
- Task to develop new German aviation strategy
- Until now for civil aircraft, but this time it shall include air traffic and military aviation
- Dual use will have to be addressed

Hartwig Hagen, DLR-PT, for the AREANA project

- Needs for defense become really close & clear
- Dual-use will be important to move ahead

VIENNA AVIATION DAYS 2025

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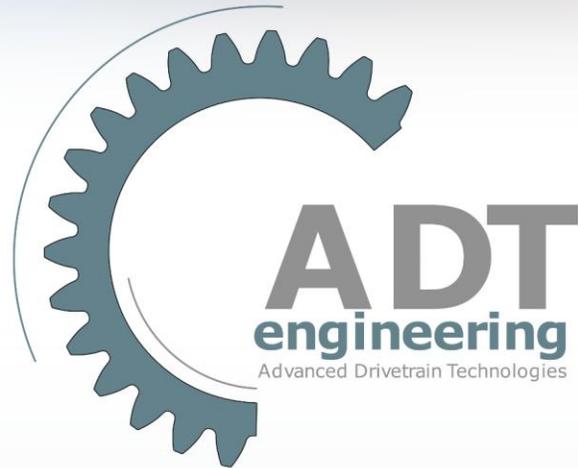


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