NEWSLETTER

Issue 3 - May 2026

The Future of Sustainable Aviation:

AIRBUS Defence & Space Use Case B

Issue 3 is dedicated to the significant progress on **Use Case B (UCB)**—a next-generation regional aircraft concept designed to enable deep decarbonisation of aviation beyond 2035. Anchored in distributed hybrid-electric propulsion, liquid hydrogen and fuel cell technologies, and an integrated aircraft-level design approach, UCB represents HERA's long-term vision for sustainable regional transport.

With UCB now established as **the primary HERA use case supporting hydrogen technologies**, the focus moves toward finalising system architectures, enhancing aerodynamic efficiency, and pursuing fully coupled multidisciplinary optimisation. Together, these efforts strengthen the technical foundation for **a low-emissions regional aircraft** and reinforce HERA's contribution to Europe's clean aviation roadmap.

Enjoy the read!

On behalf of the HERA Project Coordinator

LEONARDO

HERA

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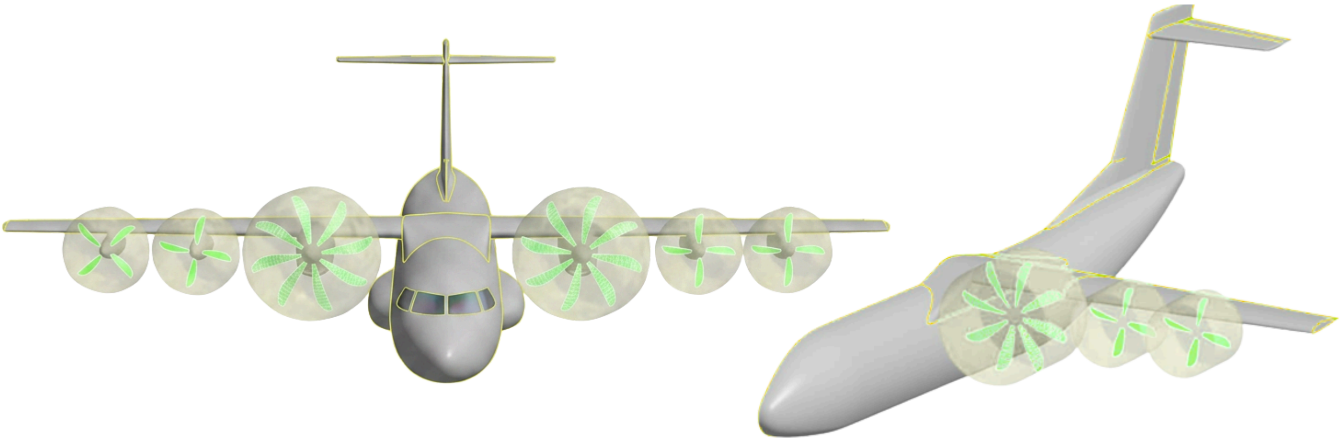
Use Case B:
Enabling a Step-Change in Sustainable Regional Aviation

Airbus Defence and Space is developing **Use Case B (UCB)** as a forward-looking aircraft concept designed to support the maturation and integration of next-generation sustainable aviation technologies. UCB represents a key long-term reference configuration within the Clean Aviation framework, with an Entry-Into-Service beyond 2035, targeting the 2040 horizon.

The concept is based on a distributed hybrid-electric propulsion architecture, enabling aerodynamic and power-distribution advantages while reducing the size and thermal load of individual propulsion units. Sustainability is at the core of the design, with liquid hydrogen and fuel-cell technologies forming the backbone of the energy system.



UCB is conceived as an **80-passenger regional aircraft**, with a payload of approximately 8.8 tonnes, supporting both a 500 NM design mission and a 250 NM representative regional mission, at a maximum cruise speed of 300 KTAS. These characteristics position the aircraft as a credible long-term solution for low-emission regional aviation.

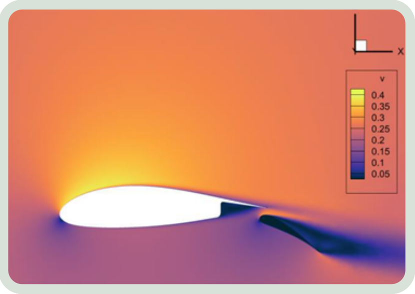
As the primary use case supporting fuel-cell and liquid-hydrogen tank technologies, UCB enables a progressive reduction in fuel burn per passenger. Technology contributions from hybrid propulsion, advanced wing and fuselage concepts, and sustainable aviation fuels indicate a potential reduction of up to 50% in fuel burn through technology alone, and up to 90% when combined with Sustainable Aviation Fuels (SAF), compared to the state-of-the-art 2020 reference aircraft.

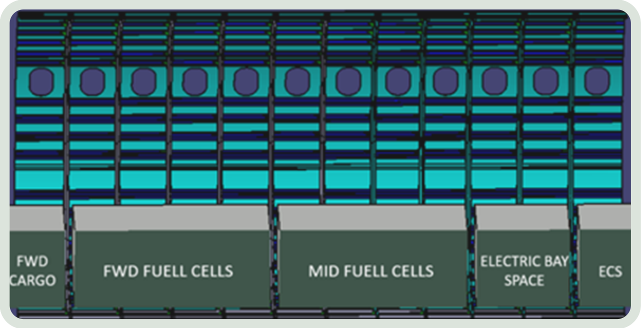
In this context, UCB represents the long-term evolution of regional aircraft architectures, succeeding mid-term concepts and providing a robust platform for the validation of hydrogen-electric aviation solutions at aircraft level.

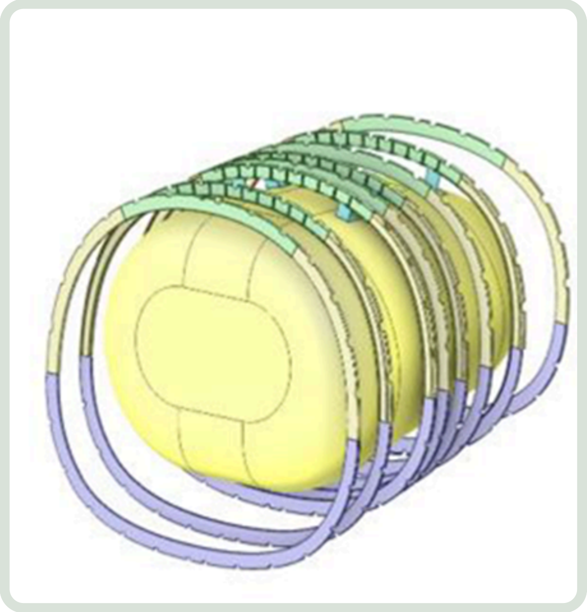
Key Technologies Driving UCB Fuel Efficiency

The UCB concept integrates a comprehensive set of advanced technologies aimed at delivering a step change in aircraft fuel efficiency, with a targeted 50% reduction in block fuel consumption compared to state-of-the-art 2020 reference aircraft.

At the core of this ambition is a hydrogen-based hybrid powerplant, combining fuel-cell systems with electric propulsion to maximise overall energy efficiency while significantly reducing emissions. This innovative propulsion approach is complemented by a new wing architecture, optimised for aerodynamic performance and propulsive interaction, and a re-engineered fuselage design tailored to accommodate hydrogen systems while minimising structural and aerodynamic penalties.







Beyond the primary airframe and propulsion enablers, UCB relies on a set of key system technologies to unlock the full potential of the concept. These include a high-efficiency electrical power distribution architecture, an advanced thermal management system capable of handling the specific demands of hybrid-electric and fuel-cell operation, and next-generation flight control and ice-protection systems designed for enhanced performance, reliability, and integration. Together, these technologies form a coherent and mature architecture that positions UCB as a cornerstone for long-term sustainable regional aviation, providing a robust platform for the validation and integration of hydrogen-electric solutions at aircraft level.

UCB synergies

The UCB concept has been developed as a **strongly integrated**, **collaborative reference configuration**, leveraging synergies across a wide range of Clean Aviation and HERA-related projects. It serves as a unifying framework in which technologies, architectures, and methodologies developed in parallel initiatives are consolidated at full aircraft level.

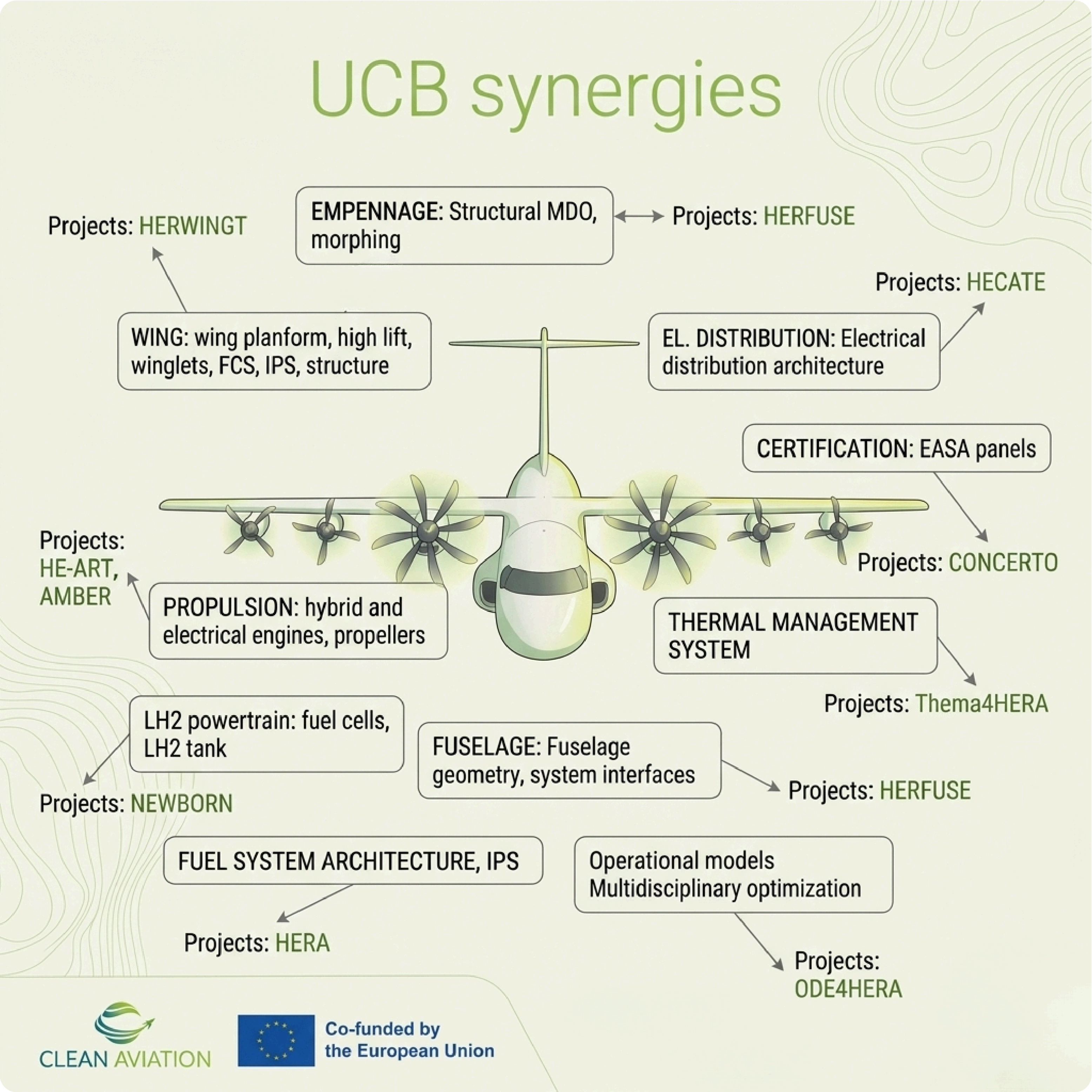
From a **certification perspective,** early engagement with **EASA panels** ensures that emerging technologies and novel architectures are assessed with regulatory alignment in mind, supporting a credible pathway towards future certification.

At the system and airframe level, UCB benefits from coordinated contributions across multiple domains. **Wing technologies**, including planform definition, high-lift systems, flight control integration, ice-protection solutions, and structural concepts, are supported by results from HERWINGT. **Fuselage design and operational modelling,** including geometry definition, system interfaces, and multidisciplinary optimisation, build upon work performed within HERFUSE. **Empennage concepts**, including advanced structural design and morphing solutions, are addressed through ODE4HERA activities.

Propulsion-related synergies are a cornerstone of the UCB architecture. Hybrid and electric engines, propellers, and overall powertrain integration are informed by contributions from HE-ART, AMBER, and CONCERTO, while liquid **hydrogen tanks and fuel-cell systems** are developed in close alignment with NEWBORN and related hydrogen-focused projects. Supporting system architectures, such as **electrical power distribution, fuel system architecture, ice-protection**, and **thermal management,** are addressed through collaborations with HECATE, THEMA4HERA, and HERA.

Through this extensive network of technical synergies, UCB acts as a **long-term integrator and validation platform**, ensuring coherence across projects and enabling a holistic assessment of hydrogen-electric aircraft technologies at the aircraft-system level. It thereby reinforces the strategic role of UCB as a cornerstone for the maturation of sustainable regional aviation concepts.

UCB synergies



UCB synergies

EMPENNAGE: Structural MDO, morphing ↔ Projects: HERFUSE

WING: wing planform, high lift, winglets, FCS, IPS, structure → Projects: HERWINGT

EL. DISTRIBUTION: Electrical distribution architecture → Projects: HECATE

CERTIFICATION: EASA panels → Projects: CONCERTO

PROPULSION: hybrid and electrical engines, propellers → Projects: HE-ART, AMBER

THERMAL MANAGEMENT SYSTEM → Projects: Thema4HERA

LH2 powertrain: fuel cells, LH2 tank → Projects: NEWBORN

FUSELAGE: Fuselage geometry, system interfaces → Projects: HERFUSE

FUEL SYSTEM ARCHITECTURE, IPS → Projects: HERA

Operational models
Multidisciplinary optimization → Projects: ODE4HERA

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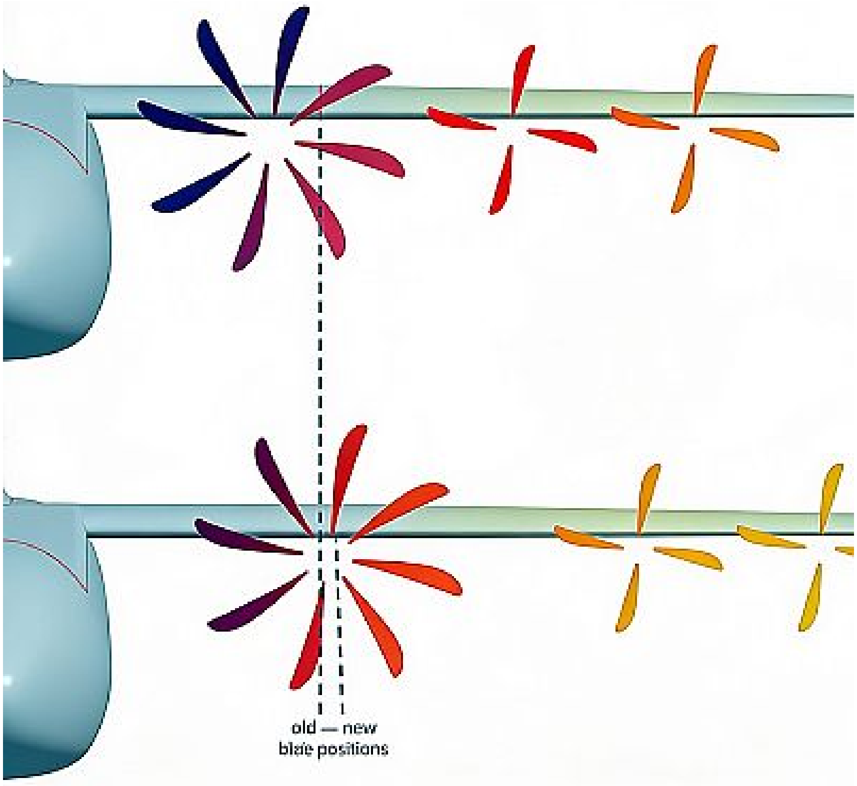
Aero-propulsive optimization

Aero-propulsive optimization is a cornerstone of the UCB development strategy, addressing the strong coupling between aerodynamic performance and distributed propulsion systems. Within HERA, a dedicated multidisciplinary optimization campaign has been conducted to jointly refine **wing planform characteristics and propeller integration**, in close collaboration with industrial partners.

The optimization process focused on maximising overall aerodynamic efficiency while minimising drag, through the coordinated adjustment of wing geometry, propeller positioning, and propulsive operating conditions.

The results demonstrate measurable improvements resulting from refined propeller placement and wing geometry adjustments, including reduced drag and increased lift, despite local increases in propeller rotational speed and power demand. Notably, the optimisation revealed that carefully repositioned propellers relative to the fuselage and wing kink location can significantly enhance the aero-propulsive interaction, delivering a net benefit in aerodynamic efficiency.

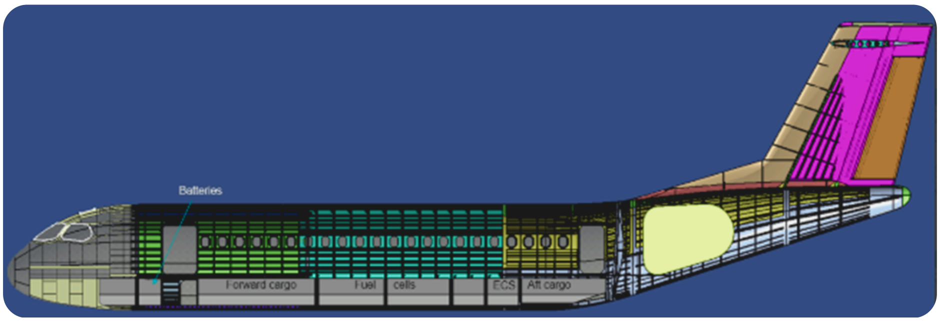
This work confirms the critical role of integrated aero-propulsive design for future hybrid-electric aircraft concepts. It also reinforces the relevance of UCB as a technology validation platform, capable of capturing complex interactions between airframe aerodynamics and advanced propulsion architectures, and translating them into tangible performance improvements.

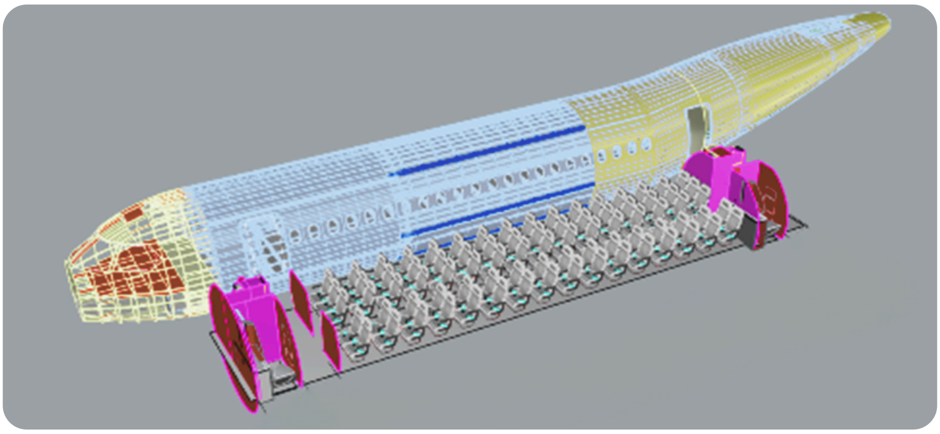


Fuselage configuration

The UCB fuselage configuration has been developed to support the ambitious integration requirements of a hydrogen-based hybrid-electric aircraft, while ensuring structural efficiency, system accessibility, and operational robustness. The preliminary fuselage design, completed within the HERFUSE framework, reflects a balanced approach between payload capability, propulsion integration, and aircraft performance objectives.

The configuration has been specifically tailored to accommodate **liquid hydrogen tanks, fuel-cell systems,** and batteries, with clearly defined interfaces that ensure compatibility with surrounding structures and onboard systems. Particular attention has been paid to the integration of the empennage, landing gear, and cargo-passenger layout, enabling a coherent and adaptable fuselage architecture



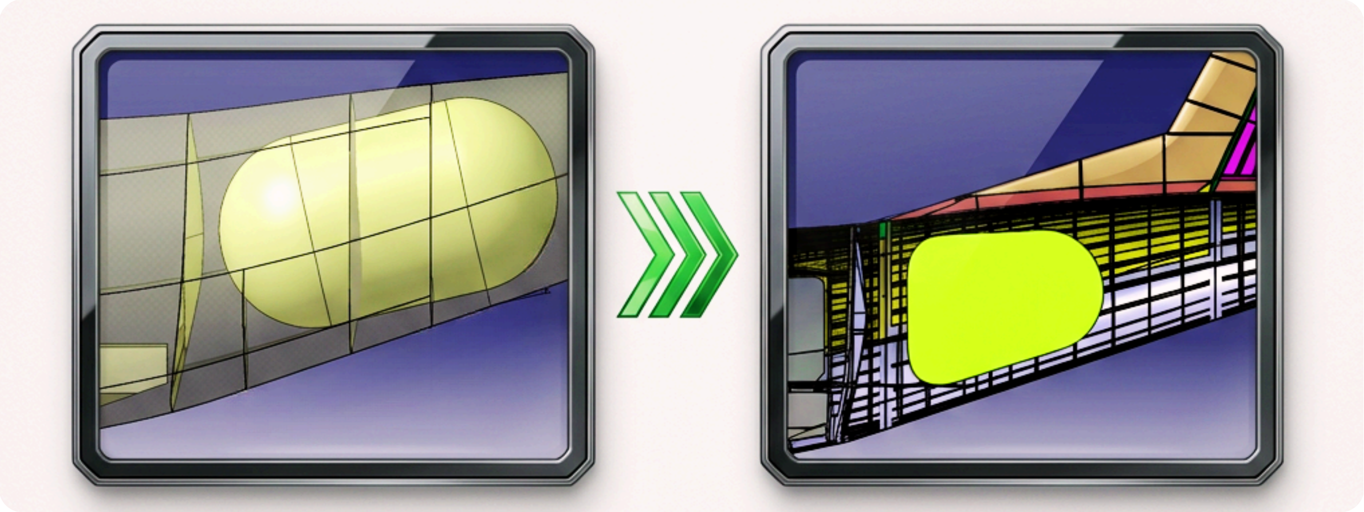


Digital-driven approaches support early design optimisation and risk reduction. Together, these elements position the UCB fuselage as a **robust and forward-looking platform**, capable of supporting the complex system integration challenges associated with future hydrogen-electric regional aircraft.

Hydrogen tank

The integration of the Liquid Hydrogen (LH_2) storage system represents a critical enabling element of the UCB aircraft architecture and a cornerstone of its hydrogen-electric propulsion strategy. The hydrogen tank configuration has been specifically adapted to the UCB layout, addressing the stringent volumetric, structural, and integration constraints associated with cryogenic fuel storage in a regional aircraft environment.

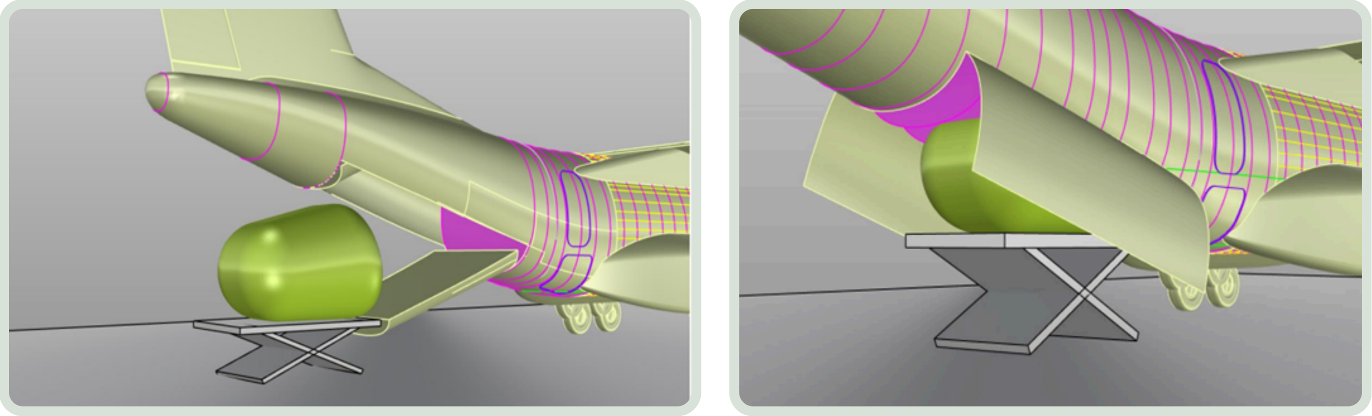
The current baseline foresees the storage of approximately **600 kg of liquid hydrogen**, accommodated within a tank volume of **12.1 m^3**, with a total tank system mass of around **1,100 kg**, including structural components, auxiliary systems, and the conditioning capsule. The resulting gravimetric efficiency reflects the advanced maturity of the concept, while maintaining safety and operational robustness. Special attention has been given to thermal performance, with controlled **boil-off rates** ensuring compatibility with operational requirements.



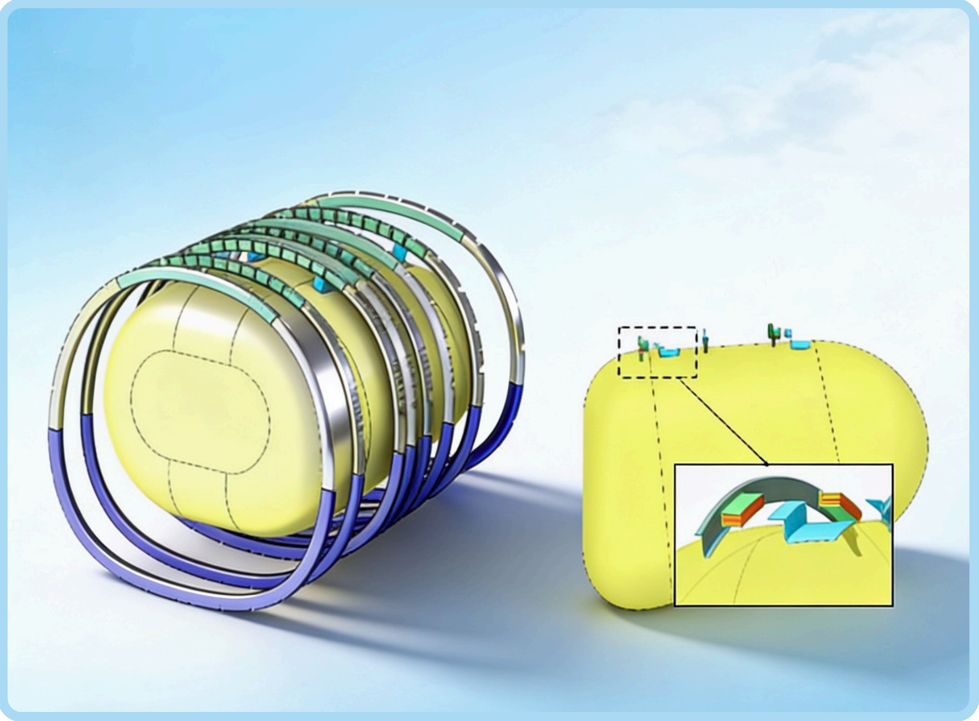
Left: *Optimized hydrogen tank concept;* ***Right:*** *Final design validation*

From an integration perspective, ongoing trade-offs focus on the adaptation of the **master fuselage geometry**, the optimisation of the **tank supporting structure**, and the definition of maintainability and extraction concepts. These aspects are essential to ensure accessibility, inspection capability, and lifecycle efficiency without compromising structural integrity or cabin and cargo arrangements.

Hydrogen tank



The preliminary design of the mechanical interface between the hydrogen tank and the airframe has been developed to meet both impact-energy absorption and efficient extraction requirements, reinforcing the overall safety case. Through these combined efforts, the UCB hydrogen tank architecture provides a robust and scalable reference solution, supporting the broader objective of validating liquid-hydrogen technologies at aircraft-system level for next-generation sustainable aviation.



Preliminary design of the mechanical interface, meeting efficient extraction and impact energy absorption requirements

Next steps

Looking ahead, the next phase of UCB development will focus on consolidating and refining the aircraft architecture through a series of targeted trade-offs and fully integrated design activities. Priority will be given to the **finalisation of system architectures,** with particular emphasis on liquid-hydrogen powertrain interfaces, thermal-management solutions, and cross-system consistency, in close alignment with linked tasks and projects.

Further efforts will address **wing geometry optimisation**, with the objective of achieving higher aerodynamic efficiency at aircraft level while maintaining structural feasibility and operational compatibility. In parallel, alternative **thrust-distribution concepts** will be explored to further enhance aero-propulsive performance and overall efficiency.

These activities will converge within a **fully coupled, multidisciplinary optimisation framework**, integrating aerodynamics, propulsion, structural sizing, noise, and systems performance. Detailed investigations will also continue on **wing aerodynamics, high-lift and flap geometry, noise characteristics**, and **structural sizing,** ensuring that performance gains are translated into a balanced and robust aircraft solution.

Together, these next steps will strengthen UCB's role as a long-term integrator and validation platform, supporting the maturation of hydrogen-electric technologies and advancing the readiness of sustainable regional aircraft concepts toward future deployment.

Designing the third era of aviation

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