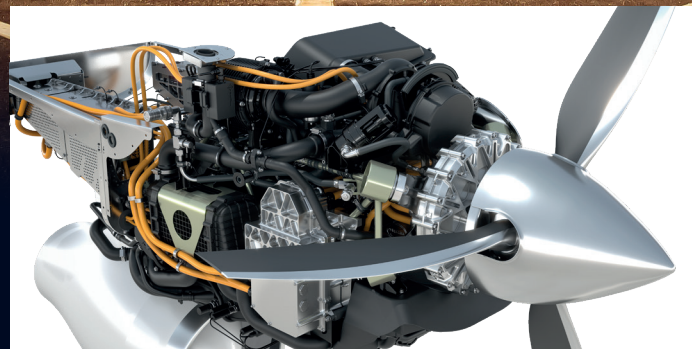
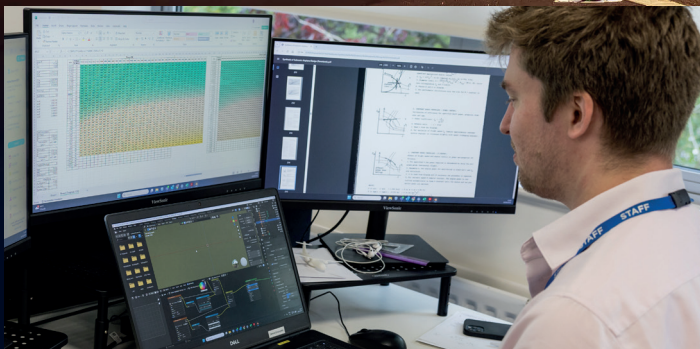


ENGINEERING CONSULTANCY SERVICES

Cranfield
**Aerospace
Solutions**



PRECISE ENGINEERING MEETS SUSTAINABLE SOLUTIONS

Cranfield Aerospace Solutions (CAeS) has an unmatched heritage in the development, modification and certification of air vehicles. We are uniquely positioned as a military and civil-approved design organisation with experience in novel aircraft platforms and propulsion systems.



1946 | Cranfield College of Aeronautics established

1993 | College achieved university status

1997 | Cranfield Aerospace Ltd formed as a spin-out

2016 | Rebranded and renamed Cranfield Aerospace Solutions Ltd

2019 | Start of Project Fresson (ATI – Hydrogen-Electric powertrain)

2024 | Product Technology division formed

2025 | AXSIM – Motorsport simulator supplier to F1 Arcade

ABOUT US

CAeS has 30 years of company history, specialising in conceptual design to flight test. Combining our unique skills of aircraft design and novel propulsion systems, processes and tools, we are well positioned to support your projects.

CAeS has supported the development of over 750 air-vehicle platforms ranging from UAV; one-off development aircraft and complex modification; and integration and certification of civil and defence platforms.

Over the last few years CAeS has developed a hydrogen-electric powertrain and hydrogen-native Unmanned Aerial Vehicle (UAV) aircraft.

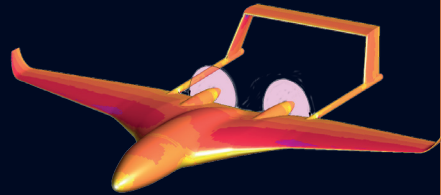
CAeS also has a strong heritage in G-cuing simulation for both military aircraft training and motorsport.

CORE CONSULTANCY SERVICES

EXTENSIVE CAPABILITIES ACROSS ALL KEY AEROSPACE DOMAINS

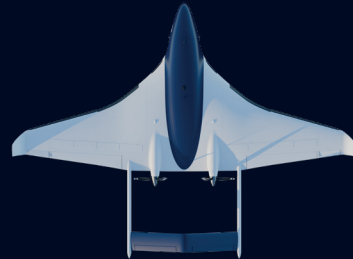
AIRCRAFT CONCEPTUAL DESIGN

We provide aerodynamic, flight performance, stability and control optimisation to improve range, payload capacity, and endurance. Working with you to support mission profile planning, we can maximise the capabilities of the air vehicle.



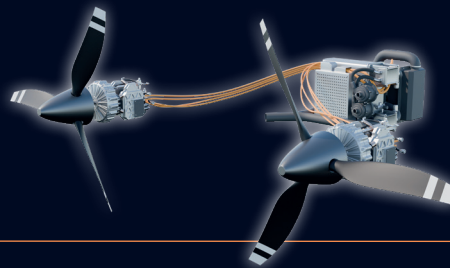
AVIONICS & ELECTRICAL SYSTEMS

We offer expertise in the design and optimisation of flight controllers, complex avionics, and both high and low-voltage electrical systems. We can advise on electrical layout, systems safety, segregation and analysis.



POWER & PROPULSION SYSTEM DESIGN

Our team supports and optimises all propulsion systems, specialising in hybrid-electric and zero-emissions powertrains through advanced multi-physics modelling and simulation. Integrating fuel cells alongside batteries can significantly extend range or endurance.



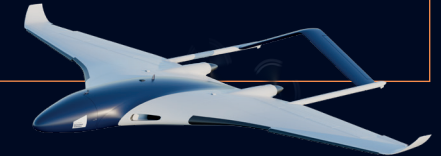
COMPLEX MODIFICATION & SYSTEM INTEGRATION

We have a legacy of supporting aircraft operators and owners with complex modifications of fixed-wing and rotary-aircraft platforms. We have experience in alternative propulsion technology integration, structural changes, or the integration of complex systems into the aircraft, including CFD, FEM, and electrical analysis.



PROTOTYPE, BUILD & TEST

We can create, manage, deliver and partner on R&D programmes. With extensive experience in building and testing sub-scale prototypes, we can support everything from simulation, iron-bird testing and flight test teams to operational planning, airfield selection, and more.



CERTIFICATION & AIRWORTHINESS

We hold Civil and Military Design Organisation Approvals under UK CAA Part 21J, BCAR A8-21, and MAA DAOS (covering aeroplanes, helicopters and RPAS). ISO 9001:2015 accredited. We can help define requirements and develop means of compliance for CS-23, CS-25, CS-27, CS-29 (or FAR equivalents) certification standards. Existing relationships with international airworthiness authorities EASA, FAA, GACA, TCCA and others.

AIRCRAFT CONCEPTUAL DESIGN

BUILDING THE FUTURE OF FLIGHT

We support both crewed and uncrewed projects across fixed and rotary wing, regional aircraft, UAVs, and eVTOL platforms. Using state-of-the-art modelling tools and decades of flight physics expertise, we rapidly generate concepts that balance performance, cost, sustainability, and manufacturability.

Our highly experienced design team use extensive, high-fidelity aircraft conceptual tools, adopting an agile design methodology tailored for aerospace.

We can work with you to explore your requirements, mission profile or technical challenge to maximise performance, be that payload, endurance, power or aerodynamic improvements. Our conceptual design experts are all PhD- and MSc-educated with extensive industry experience.

Working closely with our mechanical, electrical and systems, propulsion, manufacturing and certification engineering teams we are able to validate a multi-disciplinary, practical and all-encompassing approach to the design process to reduce iteration and maximise the economic value and global competitiveness of your solution.

Whether you're an OEM, Tier-1, or a startup pushing boundaries, we help transform your vision into an optimised, investment-ready platform design.

CASE STUDY: PROJECT BETA

In 2025, Safran central technologies (Paris) commissioned CAeS to support the development of their own hydrogen programmes.

Working with the Safran team, CAeS are developing a 50-PAX regional aircraft to design, test and iterate with new hydrogen powertrain pseudo technologies. With CAeS acting as both pseudo airframer and technology supplier. Models and flight analysis provide the team with the opportunity

to understand the environmental and performance challenges associated with the state-of-the-art technology being developed.

By exploring the integration of complex next generation system technologies through the product life-cycle, CAeS and Safran are able to accelerate early-stage developments, expose aircraft level technology challenges and increase system efficiency.



AVIONICS & ELECTRICAL DESIGN

SMARTER, SAFER AND SEAMLESSLY INTEGRATED

From traditional aircraft to advanced UAVs, we design and integrate avionics and electrical systems that enhance safety, reliability, and mission capability. Our services span across cockpit systems, power distribution, communications, mission equipment integration and more ...

With a strong compliance and documentation culture (regularly audited by the UK CAA and MAA), we ensure designs are aligned with both civil and military certification requirements – keeping your programme on time, on budget, and ready for approval.



Photo courtesy of Cranfield University

CASE STUDY: NATIONAL FLYING LABORATORY CENTRE

Cranfield University's National Flying Laboratory Centre (NFLC) is home to a uniquely modified Saab 340B aircraft – an airborne classroom and laboratory that delivers hands-on aerospace education at 20,000 feet.

This innovative platform allows students to experience real-time flight data, system operations, and aircraft performance in a live environment, bridging the gap between theory and practice.

CAeS supported the design, development, integration and installation of a wide range of equipment for this unique aircraft modification.

CAeS also delivered the certification process, including flight testing.

- | Complex Flight Test Instrumentation (FTI) suite measuring all flight control movements, processes the data, and displays it directly to each student
- | New equipment rack housing data acquisition and management equipment (installed Data Acquisition Computer, Inertial Measurement Unit, Sideslip Vanes, Navigation System, GPS Splitters)
- | Cockpit interface in centre pedestal that allows full control of the FTI equipment, battery isolation, master switch, WiFi switch, etc.
- | Charging for the students' tablets via USB or 240V AC.
- | Camera System for external forward view, cockpit view, and wing view
- | WiFi System supporting wireless data transmission inside the passenger cabin (including T-PED testing for compliance demonstration)
- | Installation of a passenger door in the rear bulkhead to make the cargo compartment accessible in flight
- | Installation of a FLARM Safety System, enhancing situation awareness for the flight crew



- | Intercom headset sockets for classroom demonstrators
- | Certification Basis included Certification Review Items for "Lithium Battery Installations" (CRI F-04) and "WLAN and Interfacing (T-)PEDs" (CRI F-01)

POWER & PROPULSION DESIGN

MAXIMISING YOUR MISSION

At CAeS we can support your full propulsion system design and optimise it to achieve your mission profile, integration, and certification.

Through multi-physics modelling and simulation, we can explore all powertrain and propulsion architectures to optimise performance for environmental, safety, payload and power demands.

Our recent studies have explored retro-fit of hydrogen-electric and hybrid power derivatives across a wide range of platforms, from eVTOLs to UAVs, helicopters, CS-23 and CS-25 aircraft.

We specialise in fuel cell propulsion system design, build, and test. With our expansive eco-system, we can also support system and supplier selection, system control, thermal management, fuel distribution and control, fuel storage, manufacturing and assembly.

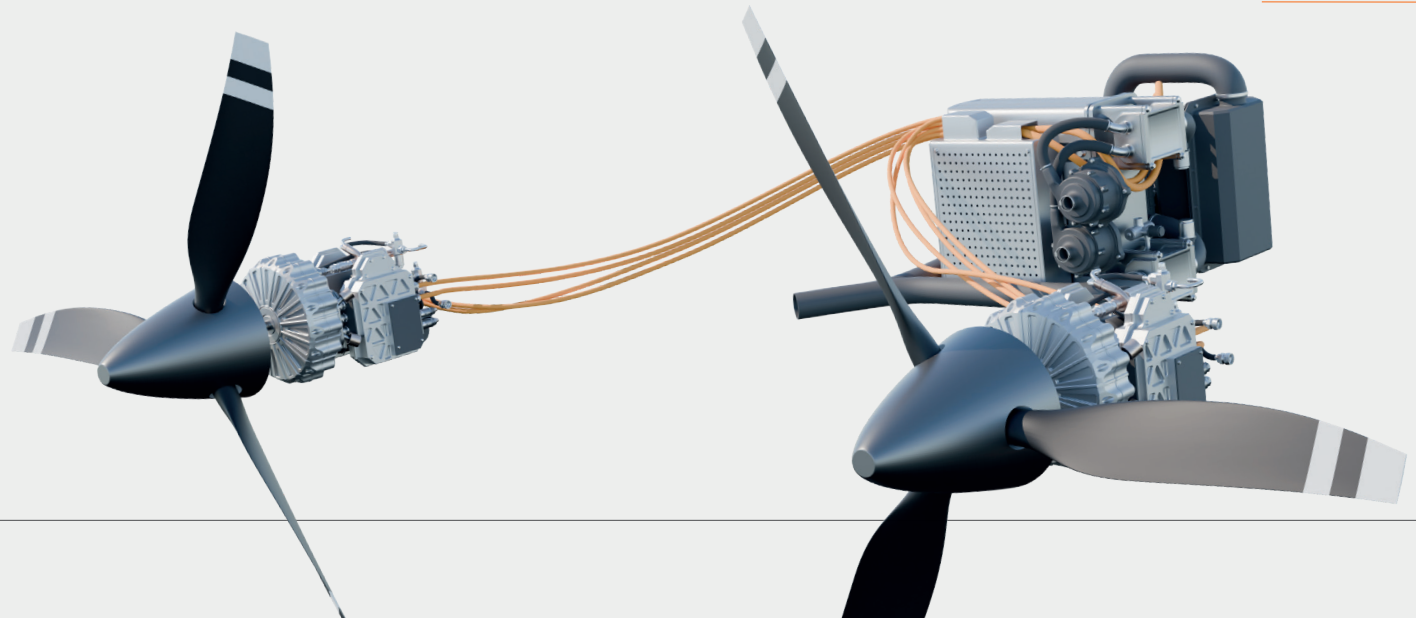
CASE STUDY: PROJECT FRESSON

In 2019, CAeS led a research programme to develop a hydrogen-electric powertrain.

Developed for passenger aircraft, the powertrain represents a substantial step forward in aero-native modular, scalable zero-emission propulsion systems. The technology developed provides a highly adaptable architecture designed for aerospace certification. The technology provides highly efficient performance, low maintenance and low total cost of ownership.

OUT-PERFORMING CONVENTIONAL TECHNOLOGY

Hydrogen significantly exceeds the performance of battery-only solutions. Customer-led studies have demonstrated opportunities to substantially increase mission range. The unique capability of the powertrain provides opportunities for distributed propulsion, high altitude, low noise, low thermal signature and contested logistics.



CORE POWERTRAIN CAPABILITIES

Fuel Cell Propulsion System Design

Using full multi-physics, model-based systems engineering to accelerate and optimise the powertrain and build resilience. System integration with path to virtual certification.

Propulsion (e-Motor, Control, Propeller)

Noise reduction, highly efficient system integration, thermal management and control. Working with key partners.

Fuel Cell Stack & Balance of Plant (HFCS)

Adaptable fuel cell partners (LTPEM & HTPEM / HTSOX) key differentiation in cathode/anode and electrical BOP integration for system efficiency and mass reduction.

Hybridisation

Combining battery technologies with different fuels to extend range and manage peak power demands and recharge, optimising turn-around times.

Thermal Management

Highly efficient, fully integrated. Transition to additive manufacture to reduce mass, aid structural integration.

Hydrogen Distribution & Control

Pressure regulation, H2 refuelling, safety and segregation.

System Control

Aero-Native FADEC development, system monitoring, safety segregation.

Hydrogen Storage

Adaptable Hydrogen storage, gaseous hydrogen (GH₂), transition to passive liquid hydrogen (LH₂) and metal hydride storage solutions. Structural or integrated storage tanks.

Manufacturing & Assembly

State-of-the-art modular manufacturing with adaptable modular build, test and validation. Pilot line facility development to support scalability and expansion.

COMPLEX MODIFICATION & SYSTEMS INTEGRATION

ENGINEERING SOLUTIONS FOR CHALLENGING UPGRADES

Whether it's a structural upgrade, new mission system, or performance-enhancing retrofit, we deliver certified modification packages tailored to your aircraft type. Our rigorous systems engineering methodology and integration expertise covers mechanical, electrical, and digital systems, ensuring new technologies work seamlessly within existing platforms. We can manage modifications through approval pathways efficiently, reducing programme risk and accelerating time to market.

With a proven track record of over 750 modifications, our portfolio encompasses

UK CAA and EASA CS-23, CS-25, CS-27, and CS-29 certified fixed- and rotary-wing manned aircraft, as well as Unmanned Aerial Systems (UAS) including both conventional and VTOL (Vertical Take-Off and Landing) architectures.

Our experience includes the integration of avionics Line Replaceable Units (LRUs), Integrated Modular Avionics (IMA), Flight Management Systems (FMS), Attitude and Heading Reference Systems (AHRS), Air Data Computers (ADC), Power Distribution Units (PDUs), and compliance with ARP4754A, DO-160G, DO-254, and DO-178C standards.

We specialise in the end-to-end integration of mission systems, including Payload Management Units (PMUs), SATCOM and tactical datalink antennas, advanced sensor suites (EO/IR, SAR, SIGINT), flight-test instrumentation (FTI) networks, rapid role-change mission kits, and other bespoke modifications.

Our avionics solutions encompass the installation and certification of Automatic Dependent Surveillance-Broadcast (ADS-B), Traffic Collision Avoidance Systems (TCAS), Terrain Awareness and Warning Systems (TAWS), Mode S transponders, and compliance with UK CAA Airworthiness Notices, Certification Specifications, and applicable AMC/GM guidance.

All solutions are engineered for conformity with stringent airworthiness, electromagnetic compatibility (EMC), and safety-of-flight requirements, ensuring optimal performance and reliability in demanding operational environments.

CASE STUDY: FAAM Airborne Laboratory

The FAAM Airborne Laboratory is an atmospheric science research facility based on the Cranfield University campus alongside Cranfield Airport. It was formed by a collaboration between the Met Office and the Natural Environment Research Council in 2001.

CAeS designed and certified many of the extensive modifications and role changes of this unique BAe 146-301 aircraft.

Examples of the tasks include:

- I Range extension fuel tanks including all control and fuel flow regulation.
- I LIDAR (Light Detection and Ranging)
- I SWS (Short Wave Spectrometer)
- I ISMAR (International Sub-Millimetre Airborne Radiometer)
- I IR Camera
- I GDR (Global Dynamic Radiosonde)



BAE SYSTEMS

AIRBORNE
LABORATORY



CERTIFICATION & AIRWORTHINESS

COMPLIANCE WITHOUT COMPROMISE

Cranfield Aerospace Solutions Ltd (CAeS) is renowned for its expertise in complex aircraft modification, advanced concept aircraft development, and comprehensive certification services. We deliver fully certified, turnkey Supplemental Type Certificate (STC), Major Change, and Minor Change modification packages, precisely aligned with UK CAA Part 21 Subpart J (Design Organisation Approval) and Part 145 (Maintenance Organisation Approval) requirements.

Our regulatory privileges empower us to approve a broad spectrum of major and minor modifications. Leveraging deep experience in technical documentation, compliance demonstration, and proactive regulatory engagement, reflecting our established authority and trust within the industry.

We streamline the certification pathway – enabling your programme to progress seamlessly from initial design through to final delivery, with complete confidence in regulatory compliance and airworthiness.

EXTENSIVE APPROVALS

UK CAA Part 21J and BCAR A8-21 Design Organisation Approvals with scope for major changes and repairs to Civil Small and Large Rotorcraft and Civil Small and Large Aeroplanes.

CAeS hold UK MAA DAOS approvals for major changes and repairs to UK MoD Aeroplanes, Helicopters and Remotely Piloted Aircraft Systems (RPAS).



CASE STUDY: ISTAR PLATFORMS

Our comprehensive design services supported the following 'MAJOR' modifications to the ISTAR platforms:

- Mechanical and electrical systems design and integration
- Structural analysis, including static, fatigue, and damage tolerance assessments
- Icing prediction and mitigation strategies
- Modifications to pressure bulkheads and other primary structures
- Weight and balance analysis and reporting
- Flight performance evaluation and optimisation
- Planning and execution of flight test campaigns
- Certification support and documentation
- Outer Mold Line (OML) support
- Wind tunnel testing and validation

Our multidisciplinary team ensures that every aspect of the modification process – from initial concept through to certification and operational support – is delivered to the highest industry standards.

PROTOTYPE, BUILD & TEST

FROM DIGITAL MODEL TO DEMONSTRATOR

We support clients with comprehensive in-house rapid prototyping capabilities, ranging from additive manufacturing of aerospace-grade components to the development of full-scale demonstrator platforms. Our prototyping process is underpinned by advanced digital engineering tools, including Computational Fluid Dynamics (CFD), Finite Element Analysis (FEA), and Model-Based Systems Engineering (MBSE), ensuring robust virtual validation prior to physical build. Prototypes are further validated through structured ground and flight test campaigns, conducted in accordance with UK CAA and EASA test protocols.

Our agile development methodology enables rapid design iteration, allowing clients to accelerate technology readiness levels (TRL), secure funding, validate novel concepts, and achieve critical customer milestones with reduced lead times.

Our team have extensive experience across the product lifecycle. From technology prototype development, technology readiness assessment and design for manufacture / assembly, through to production readiness, certification and testing including new product introduction, establishing steady-state production and supply chain management.

By combining agile prototyping with our extensive experience in UK CAA certification, Permit to Fly applications, and airworthiness compliance, we offer a true end-to-end solution. This integrated approach enables clients to efficiently and effectively demonstrate new technologies in a controlled, compliant, and expedient manner.



CASE STUDY: NASA BOEING X-48B/C

The X-48 Blended Wing Body (BWB) concept represents a transformative step forward in the evolution of passenger transport aircraft, setting new standards for aerodynamic efficiency and structural integration. Through an 11-year strategic collaboration with NASA, Boeing, and the United States Air Force, CAeS played a central role in advancing the state of the art in experimental aircraft design and validation.

CAeS was instrumental in the end-to-end design and integration of advanced aircraft systems, as well as the development of a sophisticated ground control station for remote piloting. This partnership enabled the successful engineering and assembly of the X-48B and X-48C flight test demonstrators, which incorporated cutting-edge technologies in flight control, data acquisition, and composite structures.

CAeS provided technical support throughout seven years of rigorous flight testing that contributed to the refinement of novel control laws, the validation of blended wing body aerodynamics, and the demonstration of safe, reliable unmanned operations.

The X-48B's record-setting 130 sorties established it as the most extensively flown unmanned X-plane of its class, providing an unprecedented volume of flight data. The programme's collaborative achievements have directly influenced the global aerospace community, accelerating the adoption of blended-wing body concepts and informing future commercial aircraft development. The X-48 initiative stands as a benchmark for innovation, demonstrating the power of international partnership in delivering disruptive technologies and shaping the future of sustainable aviation.

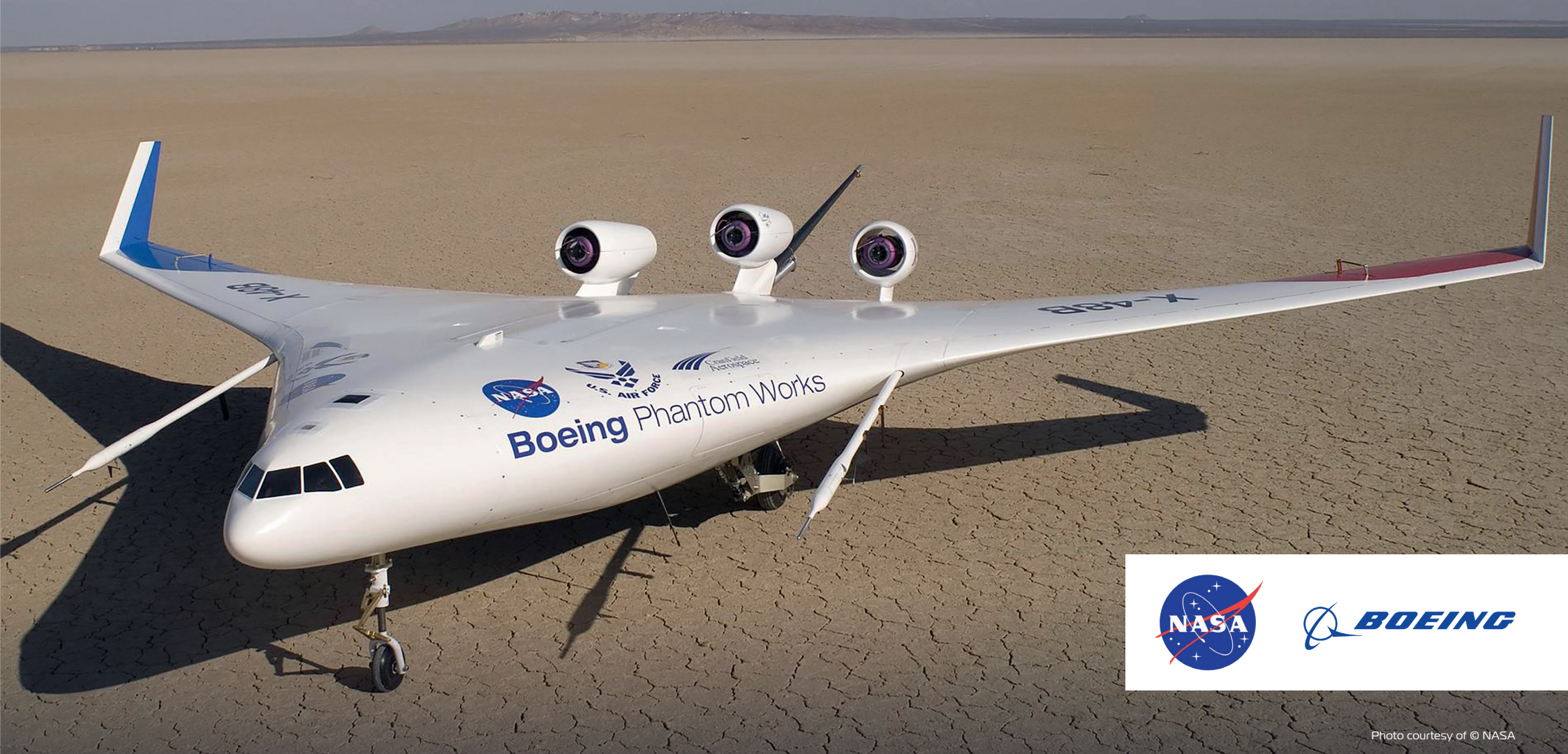
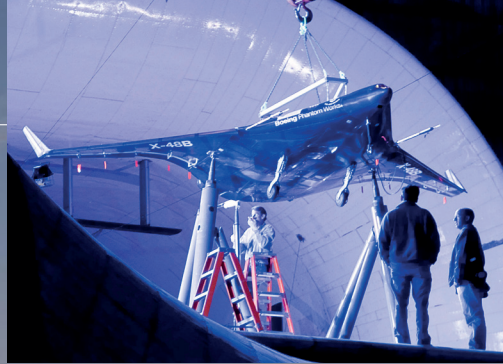
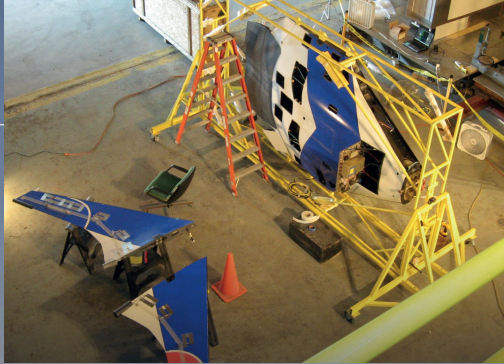


Photo courtesy of © NASA



WHY CHOOSE CAeS?

- Decades of proven aerospace heritage
- UK CAA Part 21, BCAR A-21 & MAA DAOS approved
- Agile, responsive, and cost-effective consultancy
- Expertise in hydrogen, hybrid, and electric propulsion
- Trusted by OEMs, Tier-1 suppliers, defence contractors, and startups worldwide
- Turnkey supplier: Delivering or supporting every stage from initial concept, detail design, prototype and maiden flight testing



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