Aerostructures Innovation Research Hub

Supporting Australia to become a global leader in aerospace technology.

Swinburne's Aerostructures Innovation Research Hub – AIR Hub – is one of the largest and most active aerospace research collaborations in Australia. We are developing the next generation of aerostructures for use in civil aviation, electric vertical take-off and landing aircraft, Unmanned Aerial Systems, Advanced Air Mobility and space.

We are embracing digitalisation and Industry 4.0 to develop intelligent manufacturing processes using advanced composite materials, to design and produce innovative aerostructures and clean propulsion systems for next generation aircraft.

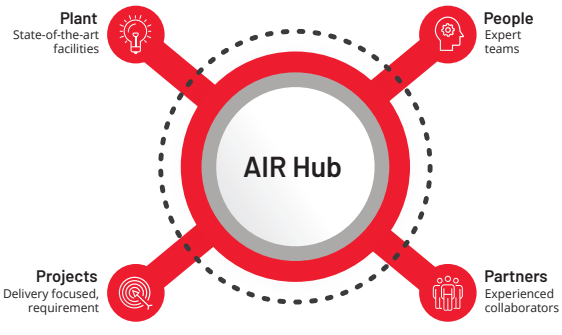
AIR Hub has partnerships and projects with Australia's most renowned aerostructures manufacturers, specialised aerospace systems providers, advanced air mobility developers, and leading evaluation and infrastructure providers.

Our mission

Our mission is to deliver advanced development projects and elevate the Australian Aerospace industry through a secure and dedicated aerospace research and development capability.

Combining cutting edge research, state-of-the-art facilities and expert teams across partner organisations, we are:

- Reinforcing Australia's civil aviation aircraft industry
- Accelerating advanced air mobility, including uncrewed air systems and urban air transport
- Establishing our capability to produce new space systems structures; and
- Commercialising clean technology to open new markets for sustainable aerospace businesses.



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Our Research Expertise

The AIR Hub is focusing our research efforts in five key areas identified as strategically important to the continuation of current Australian industry specialisations and proactive entry into emerging technology opportunities.

These are:

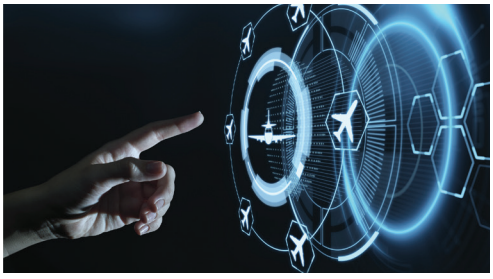
- Digitisation
- Advanced manufacturing processes
- Multi-functional materials
- Clean propulsion systems
- Advanced air operations.

Digitalisation

In collaboration with our partners, the AIR Hub is working towards a major goal of integrated digitalisation of the Australian aerospace supply chain, recognising worldwide imperatives to integrate research, development, design, manufacturing and sustainment activities in order to improve aerospace product performance, reduce lead times, reduce costs, improve manufacturing flexibility and improve sustainability.

Capabilities include:

- Model-based engineering
- Digital twinning
- Artificial intelligence driven predictive models
- Digital / physical coupling
- Augmented development
- Data-driven design
- Technology landscaping
- Generative design and topology optimisation.



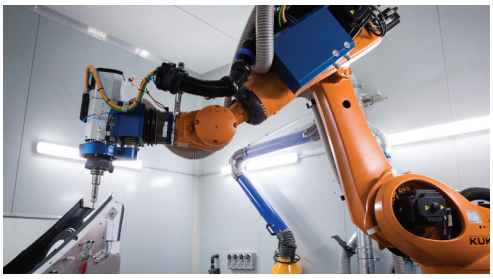
Advanced manufacturing processes

Building on Swinburne initiatives in our Factory of the Future and capabilities in Industry 4.0, AIR Hub and our partners are undertaking research and demonstrator development to maintain and extend Australia's 40+ year position as a preferred innovative sole source supplier of major aerostructures to international civil and military customers.

Current projects are focused on civil aerostructures and UAS/AAM airframes, with plans to extend into defence and space applications and emerging aviation sectors including supersonic and hypersonic air vehicles.

Capabilities include:

- Industry 4.0 and Industrial Internet of Things (IoT)
- Smart manufacturing
- Real time predictive control
- Additive manufacturing
- Automation and robotics
- Augmented manufacturing.



Multi-functional materials

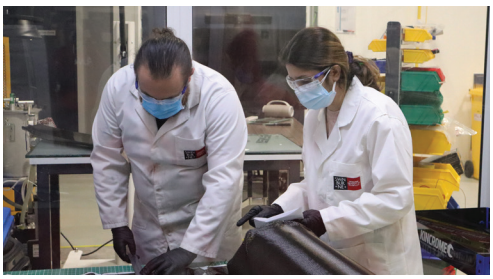
With composite materials already representing over 50% of recent aircraft structures and ever increasing, the AIR Hub and our partners are accelerating applied research in this key strategic area which has underpinned Australia's international aerostructures involvement for decades.

A phased research and demonstrator program includes enhancements to apply to current aerostructures projects including major improvements in development timescales, reduced cycle times, highly integrated structures and reduced assembly times.

In addition to the extension of existing airliner and military aerostructures, AIR Hub is leading research into aerostructures for the rapidly emerging advanced air mobility market, plus new generation uncrewed air vehicle systems.

Capabilities include:

- Fibre reinforced composite materials
- Resins and polymer chemistries
- Composite metallic hybrid materials
- Sub-structural topology optimisation
- Multi-functional materials
- Nanomaterials and smart structures.



Clean propulsion systems

Recognising the imperatives for reduced emissions associated with aerospace manufacturing and aviation operations, AIR Hub and our partners have developed proactive strategic programs to facilitate Australian leadership in appropriate niches towards zero emissions.

Working with industry and research partners including the Swinburne/CSIRO Victorian Hydrogen Hub, it has developed a multi-phase strategy to develop hydrogen propulsion for air vehicles, starting with UAS and progressively scaling up through AAM and GA aircraft to airliners. UAS, AAM and GA phases are already under way, with support by government.

The plan incorporates support for Australian SMEs to develop innovative approaches to sovereign development of propulsion system elements including storage cylinders, enhanced hydrogen storage systems, fuel cell and electric motors, with support via AIR Hub's Air Pass initiative.

Capabilities include:

- Zero emission fuels
- Hydrogen and electric energy storage for aviation
- Hydrogen and electric propulsion
- Clean, zero emissions propulsion aero-structural integration.

Advanced air operations

AIR Hub has a series of research activities under way covering AAM design optimisation, aerostructures, zero emission propulsion, ground and flight testing, flight operations, and community engagement. With support from all levels of government, AIR Hub has established an AAM Innovation Facility at Latrobe Regional Airport to facilitate research and testing of AAM air vehicles, ground support systems and air operations. This will operate collaboratively with AAM developers, research partners, regulators, potential AAM operators and regional stakeholders. Initial development flying has already commenced with a program of trials scheduled for 2023 and beyond.

Capabilities include:

- AAM design optimisation and aerostructures
- Ground and air testing
- Mission feasibility trials
- Community engagement.

Work with us

"The AIR Hub partnership heralds a new era for us [Boeing], creating innovative materials and manufacturing processes out of our Fisherman's Bend facility [in Victoria], that will be used on the next generation of Boeing aircraft."

Mike Edwards, Director, Boeing Research and Technology, Asia Pacific

Our partners

The AIR Hub brings together the research expertise of:

ARENA2036 · ANSTO · CSIRO · Monash University · Universität Stuttgart · Federation University · NIAR Wichita State University

With Australia's aerospace industry leaders:

Boeing · Quickstep · Cablex · Marand · Furnace · Shoal · memko · leidos · Thales Building a future we can all trust

AIR Pass – industry engagement program

Experience six-month prototyping and commercialisation support to get your aerospace venture's first or next customer with funding from the AIR Hub:

- Up to $150K of prototyping/engineering support and up to $50k equity-free seed funding for non-prototyping activities
- 4-8 companies
- Agile SPRINT-style project management with fortnightly reviews
- Companies incorporated into the AIR Hub network to accelerate customer growth
- AIR Hub dedicated engineering and business support
- Swinburne Innovation Precinct residence.

Customised, unique and agile

The AIR Hub has a great track record in accessing government grants and subsidies for research and development. Our membership across a number of national networks and our access to state-of-the-art facilities and researchers has helped us create this competitive advantage.

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