

PARTNERING WITH AEROSPACE DIVISION

Aerospace Division engages with Australia's industry and science and technology community through a range of innovative and mutually beneficial arrangements, and actively seeks opportunities to work with industry to commercialise DST technology and transition our innovative concepts into Defence capability.

Potential areas for collaboration include:

- Additive Manufacturing certification and lifing
- Advanced materials and systems for energy harvesting and storage
- Gas Turbine Combustion and Turbomachinery Experimentation
- Remote Thermoelastic Stress Analysis Development
- Human-Autonomy Teaming
- Synthetic environment modelling including weather, electronic warfare, and terrain representation
- Artificial Intelligence technologies for synthetic team mates
- Cross-domain security solutions for Live Virtual and Constructive (LVC) systems
- Aircraft Health and Sustainment Technologies
- Big data and data analytics
- Advanced experimental aerodynamic test techniques

For further information

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MAJOR RESEARCH PROJECTS AND ACTIVITIES

Joint Strike Fighter

DST continues to support the acquisition of the next-generation, multi-role F-35 Joint Strike Fighter as the program enters the Continuous Capability Development and Delivery phase; providing direct support to the F-35 Joint Program Office in the USA; and assisting Australian industry to engage in the program.

Uninhabited Aerial Systems

DST is undertaking research, providing advice, and delivering expertise on Uninhabited Aerial Systems (UAS), with a focus on features such as being affordable, attritable, and adaptable for a variety of mission objectives. Sensor integration, incorporation of additive manufacturing techniques, and enhanced navigation are key aspects of this research.

Partnership with Air Warfare Centre – Distributed Training Centre (AWC-DTC)

Simulation-based collective training capabilities are being transferred from the laboratory environment of DST's Air Operations Simulation Centre (AOSC) into operational service at the AWC-DTC. The collaboration informs the RAAF's future single-service and joint collective training capability. This is becoming part of the operational capability of the RAAF and will develop into an enduring Live, Virtual and Constructive (LVC) capability for RAAF collective training.

Innovative Sustainment

Cost of ownership and asset availability is a major concern for capability managers, operators and maintainers. DST are undertaking vital research in this key operational aspect in a variety of areas including artificial intelligence, big data and data analytics, prognostic condition based maintenance, and utilisation of additive manufacturing for on-demand production of certified parts.



Australian Government

Department of Defence

Science and Technology

AEROSPACE DIVISION

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DST

Science and Technology for Safeguarding Australia

Major Science and Technology Capabilities (MSTC)

Aerospace Division provides support and innovative solutions to enhance the operational capability, survivability, availability and safety of the ADF's aircraft platforms and reduce the cost of owning them and provides critical advice on the technical risk and readiness for the acquisition of such platforms. Areas of major science and technology capability are:

MSTC Aircraft Performance and Survivability - Conducts applied research in the broad disciplines of aerodynamics, aero-thermodynamics, and aerial autonomy. These core disciplines underpin system-level performance and survivability modelling and innovation for aircraft flight and propulsion, infrared signatures, stores carriage and clearances, and unmanned aerial systems.

Aerial Autonomous Systems undertakes research on the application of Uninhabited Aerial Systems (UAS) for the military environment. Areas of coverage are trusted aerial autonomy, novel UAS platform technologies and support to acquisition. UAS flight trials are conducted for system validation.

Aerodynamics and Flight Mechanics research into steady and unsteady fluid dynamics in flow regimes ranging from incompressible, subsonic, transonic, supersonic and hypersonic, that is applied to fixed wing flight vehicles; submarines and surface vessels; flight dynamic behaviour & performance; weapon aerodynamics & integration.

Infrared Signatures & Aerothermodynamics measurement and development of infrared signatures and low-observable technology for aircraft survivability. Generation of validated IR models for aircraft and missiles in support of the Airborne Countermeasures Development & Validation (ACMD&V) Program. Assessment of aero-thermodynamics of aircraft engines and power thermal management systems; experimentation in propulsion aerothermodynamics and infrared signatures.

MSTC Aircraft Health and Sustainment - Provides S&T capabilities to the ADF in the areas of safety-critical air vehicle systems; aircraft health technologies and systems; and aerospace systems sustainment analysis.

Vehicle Dynamics and Diagnostics development and assessment of prognostics and health management technologies for aircraft propulsion systems using big data analytics and deep learning; advice on acquisition and usage of aircraft health management systems; field support in vehicle health and diagnostics. Capabilities include: vibration and wear debris analyses; analysis and assessment of health & usage monitoring system; acoustic signature analysis and management.

Engines and Fuels Integrity assessment and validation of propulsion structural integrity for low and high cycle fatigue; probabilistic analysis; aero-engine durability; research into ultra-high temperature materials and IR coatings; and failure analysis. Operational support for ADF fuels and lubricants and research into fuel chemistry and endothermic fuels.

Airframe Diagnostic Systems development, assessment and operational evaluation of advanced structural diagnostic technologies for through-life support and improved availability of airframes. Technologies include damage and corrosion diagnostics, environmental and loads monitoring, advanced non-destructive evaluation, experimental mechanics and energy harvesting for diagnostic autonomy.

Aerospace Systems Sustainment Analysis undertakes detailed systems analysis of aerospace platforms to facilitate improved acquisition and sustainment decision-making over the capability life cycle. The STC conducts multi-disciplinary research into systems engineering, asset management, lifecycle costing and information science.

MSTC Aerospace Materials Technologies - Focused on world class capability in aerospace materials and processing, along with safety related advice to support the ADF. The MSTC has core technical competencies in structural materials, functional materials, advanced manufacturing and computational material analysis. It maintains a world class forensics capability to support ADF operational failures and provides leadership for investigations into military aircraft accidents.

Aerospace Metallic Technologies develop and transition metallic technologies to achieve affordable sustainment of current and future ADF platforms. Provides critical operational support to ADF platforms. Maintains an underpinning critical capability for providing scientific leadership to ADF-led accident investigations. Develop enabling metallic based technologies in additive manufacturing, advanced repair and microstructural characterisation.

Aerospace Composite Technologies develop and transition composite repair technologies to achieve affordable sustainment of ADF aircraft. Conduct research to enable timely assessment of structural integrity of composite airframes. Develop enabling technologies, including low-observable structures, multifunctional structures, and nano-materials/structures to enhance ADF's air capability.

Computational Materials and Structural Mechanics research, develop and apply computational methods on materials and structural mechanics to innovatively sustain and future-proof ADF aerospace platforms. Capabilities include: novel topological and shape optimisation, integrated design and assessment for advanced manufacturing, and advanced modelling for improved determination of materials and structural performance including fatigue lives.

MSTC Aircraft Structures - To provide safety-critical aircraft structural integrity and airworthiness advice and solutions to the ADF through targeted partnerships, research and application of innovative science and technology.

Airworthiness and Life Evaluation the capability to interpret and apply international airworthiness standards and methodologies in determining and/or predicting aircraft lives, so as to ensure continuing airworthiness under prescribed operational conditions.

Emerging Aircraft Structural Integrity the capability to conceive, develop, and champion emerging methodologies in determining and/or predicting aircraft lives, so as to provide improved means of ensuring aircraft structural integrity under prescribed operational conditions.

Structural Experimentation designs, constructs and performs complex practical experiments ranging from small coupon static tests to full-scale aircraft structural fatigue tests in support of branch, divisional, and Defence research programs. These experimental activities predominately take place in purpose-built structural laboratories unique in Australia but also include trials on service aircraft.

MSTC Aerospace Systems Effectiveness - Supports Defence outcomes in capability, efficiency and safety by providing advice and solutions where humans and air platforms or systems interact.

Human Factors conducts research into human-system effectiveness issues within the aerospace domain. This includes research on ADF aircrew individual and collective training in live, virtual, and constructive (LVC) environments, human-machine interfaces, and human interaction with autonomous systems.

Air Operations Simulation Centre conducts research in the simulation domain and provides a human-in-the-loop simulation and modelling capability to support ADF operations where aircrew are a critical component of the system or sub-system of interest. This work extends to the support of the interoperability of LVC systems for training and experimentation.

Helicopter Systems Effectiveness undertakes research and develops fluid dynamics and flight models of military helicopters to undertake operational effectiveness studies. Vision systems research is undertaken with a particular focus on enhancing ADF capability in degraded visual environments, including night operations.