

NRC Institute for Aerospace Research

The NRC Institute for Aerospace Research (NRC Aerospace) is Canada's foremost centre for aerospace research. NRC Aerospace undertakes and promotes research and development (R&D) in support of the Canadian aerospace community in matters affecting the design, manufacture, performance, use and safety of aerospace vehicles and related products. The Institute maintains expertise in and operates national facilities in five areas of interest: aerodynamics, aerospace manufacturing technology, flight research, gas turbine research, and structures and materials performance.

Aerodynamics

NRC Aerospace engages in research and provides services to clients in fixed- and rotary-wing aerodynamics, and in the aerodynamics of surface vehicles and ground-based structures. Sophisticated computational fluid dynamics (CFD) tools coupled with high-quality data from productive wind tunnels provide cost-effective support for aerodynamic research and product development. A significant capability exists to study the effects of icing on the performance of aircraft, helicopters and cables.

Major facilities include a 1.5 m Trisonic Pressurized Blow-down Wind Tunnel, a 9 m x 9 m Low Speed Wind Tunnel, a 2 m x 3 m Low Speed Wind Tunnel, a 3 m x 6 m Open Circuit Propulsion and Icing Wind Tunnel, and a 120-node computational cluster.

Aerospace manufacturing technology

NRC Aerospace investigates and develops aerospace manufacturing technologies that are expected to yield significant cost savings, while maintaining high levels of quality, reliability and performance. These technologies include metal and composite forming, joining, machining,



and finishing technologies for both aircraft and engine components, as well as automation and robotics for assembly and surface treatments.

Major facilities include a 500-ton isothermal forging press; a 1000-ton hydroforming press; Nd-YAG and CO₂ laser, electron beam, friction stir, and linear friction welding machines; fibre placement machinery; a 20' x 6' high-temperature autoclave; resin transfer moulding equipment; a 20' x 20' x 20' gantry with 2 multi-axial Kuka robots; intelligent shot peening equipment; a 5-axis Makino multi-tasking machining center; a 6-axis Boehringer two-spindle turning centre; and an online coordinate measurement system.

Flight research

NRC Aerospace performs airborne research and flight tests, explores flight mechanics and avionics technologies, and provides expertise in aircraft safety related systems and accident investigations. Its Flight Recorder Playback Centre provides complete capabilities for the playback and analysis

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of cockpit voice recorders, digital and analogue flight data recorders, air traffic control tapes, and videotapes.

To carry out these studies, NRC Aerospace maintains and operates a fleet of experimental aircraft that includes a Bell 412 Advanced Systems Research Aircraft, a Bell 205 airborne simulator, a Bell 206 helicopter configured for night vision operations, a Twin Otter equipped for atmospheric sampling, a Convair-580 flying laboratory, a Falcon-20, a CT-133, and a Harvard Mark IV.

Gas turbine research

NRC Aerospace has unique facilities and expertise to assist industry in developing and evaluating the performance of gas turbine engines and components, in compliance with increasingly stringent environmental, safety, and operational requirements. Supporting these activities are air compressor/exhauster facilities that can supply up to 56 lb/s of dried and heated or refrigerated air at 325 psi.

Other facilities include a high-pressure steam plant, a large-scale test rig, a large-scale transonic planar cascade, five combustion test cells, four engine test cells (two capable of icing simulation), static and dynamic test rigs for radial bearings, oil-free bearings and seals, high-pressure spray and atmospheric mixing rigs, and icing and hail facilities for certification testing.

Structures and materials performance

NRC Aerospace conducts research on issues affecting the design, strength, durability, structural integrity and performance of new and legacy aircraft structures and components. It develops new design, analysis, and manu-

facturing technologies for structures and materials, as well as for noise and vibration control. Technologies to support existing aircraft fleets, such as non-destructive inspection and better coatings, are also investigated.

Major facilities include a high-intensity acoustic reverberant chamber, large electrodynamic shaker, advanced composites facility with a Class 100,000 clean room, state-of-the-art unbalanced magnetron sputter coating system (PVD coater), two high velocity burner rigs, a spin rig, and a drop tower impact facility.

Located in Ottawa and Montreal, Canada, NRC Aerospace maintains an internal research program and undertakes R&D contracts, consulting, fee-for-service testing, and calibrations for hundreds of companies and organizations from around the world. It develops and transfers technology through collaborative research contracts and licensing arrangements. NRC Aerospace actively seeks out clients, collaborators and licensees for its services, technologies and expertise.

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