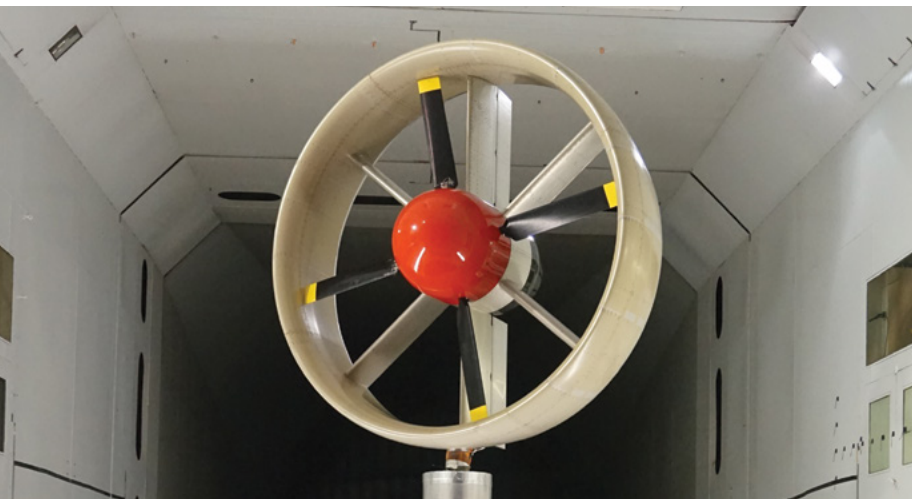
NRC·CNRC

9 m wind tunnel

The 9 m wind tunnel is a large, state-of-the-art, high security facility capable of accommodating a variety of surface vehicles, ground-based structures and aerospace models. Operated by experienced engineers and technicians, it is the facility of choice for several international original equipment manufacturers (OEMs).

Testing that offers superior performance gains

The ability to test in a repeatable environment with direct measurement of aerodynamic loads and associated air flow enables significant performance gains through the summation of several small improvements. The size of the 9 m wind tunnel accommodates model and full-scale vehicles from both the aviation and surface transportation fields. Test articles range from powered fans, to large UAVs, to light-duty passenger vehicles, to 30% and full-scale tractor and trailer combinations.



Ducted fan test

The rain-wind rig permits the study of stay-cable vibration on full-scale models

Apart from vehicles, the 9 m wind tunnel enables insight into a variety of wind-engineering challenges, such as wind effects on tall buildings and the interaction of wind and rain using a full-scale aeroelastic bridge cable system.

Areas of expertise

- Full and half-model aircraft testing
- UAV testing
- Turbulence modeling
- Full-scale automotive and commercial vehicle testing
- Ground simulation
- Rain-wind induced vibration of stay cables
- Wind-engineering/bluff-body aerodynamics
- 2-D bridge dynamics
- Wind tunnel model design and fabrication

Technical specifications

Tunnel characteristics

- Air-cooled 6.7 MW (9000 hp) DC motor that drives an 8-bladed fan
- Size: 9.1 m high x 9.1 m wide x 24 m long (30 ft x 30 ft x 79 ft)
- Maximum wind speed: 55 m/s (200 km/h)
- Turntable: Diameter: 6.1 m (20 ft), Range: ±360°, Precision: ±0.025°

Auxiliary services

- Compressed air: 1,700 kPa (250 psi) at 4.5 kg/s (10 lb/s)
- Boundary Layer Control System (BLCS): distributed floor boundary layer suction
- Instrumented mounting pads for large vehicles
- Ground Effect Simulation System (GESS): 5.6 m x 1 m (18.5 ft x 3.3 ft) centre belt with independent wheel rollers and variable-height chassis supports
- Road Turbulence System (RTS): 4% turbulence intensity with road-representative wind spectra

Data system and instrumentation

- **Load Measurement:** 6-component external balance, a selection of internal balances, as well as bespoke solutions for custom needs
- **Instrumentation capabilities:** Dynamic and static pressure measurements, analog sensor acquisition with signal conditioning, accelerometers, laser displacement sensors, strain gauges, vane anemometers, five-hole and Cobra probes, numerous boundary layer and wake survey rakes, and more
- **Data reduction:** All calculations, including aerodynamic corrections, are performed in MATLAB®, with results provided in a client-defined data output format
- **Flow visualization:** Smoke, oil, tufts, thermography, wake pressure traverser, pressure sensitive paint
- **Wind tunnel operation:** LabVIEW™-based control of turntable yaw drive, six-component balance, tunnel speed, traverses, and data acquisition

This facility has a proven record of adapting to a variety of unique test requirements and offers great value in the large-scale testing arena.

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