



1.5 m trisonic wind tunnel

The 1.5 m trisonic wind tunnel continues to play an instrumental role in Canadian and international research and development of the aerodynamics of aircraft and defence systems. As a strategic national asset, the trisonic tunnel ensures Canada maintains a sovereign capability to test aircraft, stores and weapon system models at speeds greater than Mach 0.35.

Areas of expertise

- › Subsonic, transonic, and supersonic testing
- › Sting-mounted or wall-mounted models
- › Stores clearance testing
- › Advanced measurement techniques, including pressure-sensitive paint, model deformation, and model positioning
- › ISO 9001: 2015 certification

The 1.5 m trisonic wind tunnel is a pressurized, intermittent flow wind tunnel capable of providing subsonic, transonic, and supersonic flows from Mach 0.1 to Mach 4.25. Independent control of the stagnation pressure over the full operational envelope permits the tunnel to operate at a range of Reynolds numbers while maintaining a constant Mach number.



CF-18 on roof-mounted sting during stores release test.

Time to recharge between runs is less than 30 minutes. Typically, this time is used to access the model for configuration changes, which contributes to the overall productivity of the tunnel.

Our services include test project planning and coordination, test optimization, model design and

fabrication, advanced wind tunnel test techniques, data analysis, and computational fluid dynamics simulations. These test capabilities are housed in an ITAR approved secure environment that delivers high-quality aerodynamic data for validation of analysis and simulation.

Technical specifications

	Sting/plate mount testing	Half-model testing	Two-dimensional testing
Test section size	<ul style="list-style-type: none"> > 1.5 m x 1.5 m (5 ft x 5 ft) > Closed and solid wall supersonic test section > Porous wall in subsonic/transonic test section, 60° inclined holes with splitter plates, porosity variable from 1% to 6% open area ratio 	<ul style="list-style-type: none"> > 1.47 m x 1.5 m (4.8 ft x 5 ft) > Solid reflection plate in transonic test section > 3 walls with variable porosity from 1% to 6% open area ratio 	<ul style="list-style-type: none"> > 0.38 m x 1.5 m (15 in x 5 ft) > Solid sidewalls > Variable porosity ceiling and floor with same geometry as transonic test section walls
Model size	> 1 m (~40") maximum span	> 1 m (~40") max half-span	> Up to 38 cm (15") chord
Mach number range	<ul style="list-style-type: none"> > 0.1 to 1.4 subsonic/transonic > 1.1 to 4.25 supersonic 	> 0.2 to 0.99	> 0.1 to 0.9
Model support	<ul style="list-style-type: none"> > Sting and internal balance on vertical strut (range of balances available) > Plate support option available when rear fuselage geometry must be correctly represented 	> 6-component external sidewall balance	> Pair of 3-component external sidewall balances 89 kN (20,000 lb) maximum normal force, smaller ranges also available
Pitch motion	<ul style="list-style-type: none"> > Sting mount: -15° to +28° @ max 23°/s > Plate mount: 30° range @ max 15°/s 	> ± 50° @ max 15°/s external balance drive	> ± 50° @ max 15°/s dual-sided synchronous balance drives
Roll motion	> ±354° @ max 37°/s	> N/A	> N/A
Special features	<ul style="list-style-type: none"> > Model air supply > Air extraction to 1 atm from model > Combined pitch/yaw motion > Captive store load measuring rig (articulated sting) > Schlieren windows in transonic and supersonic test sections 	<ul style="list-style-type: none"> > Model air supply > Air extraction to 1 atm from model 	<ul style="list-style-type: none"> > Dual-sided model air supply > 2-D test standards > 192 orifice max model surface pressure instrumentation (96/side) > 5, 4-tube vertically traversing wake rake > Ejector augmented sidewall suction for boundary layer removal

Type of wind tunnel	Blowdown trisonic
Air supply	8.4 MW (11,250 hp) synchronous motor; 10-stage compressor
Useful running time	Typically 30 to 40 seconds. See run tables for details.
Data system (tunnel control, data gathering & processing)	144+ data acquisition channels with signal conditioning up to 25 kHz and 24 bit conversion
Typical production	10 to 20 blowdowns/day
Air storage	1,430 m ³ (50,430 ft ³) @ 21 atm and 21°C
Time to charge tanks	35 min. from empty, 25 min. between blowdowns
Schlieren system	Multi-source focussing type
Pressure module capability	<ul style="list-style-type: none"> > Scanivalve ZOC modules (1, 5, 15, and 50 psid ranges) > Support for 1024+ channels at 500 Hz
Max Reynolds number	<ul style="list-style-type: none"> > Full test section: 1.5 m x 1.5 m: 80 x 10⁶ /m (25 x 10⁶ /ft) > 2D test section: 0.38 m x 1.5 m: 160 x 10⁶ /m (50 x 10⁶ /ft)



CONTACT

Dean Flanagan
Client Relationship Leader
Tel: 1-613-990-8319
Dean.Flanagan@nrc-cnrc.gc.ca
www.nrc-cnrc.gc.ca/aerospace

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