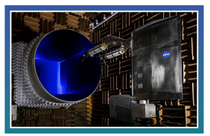
OUR FACILITIES

SUBSONIC
TRANSONIC
SUPERSONIC
HYPERSONIC

14- by 22 Subsonic Tunnel



Low-Speed Aeroacoustics Wind Tunnel

Flight Dynamics Research Facility

National Transonic Facility

Transonic Dynamics Tunnel

0.3-m Transonic Cryogenic Tunnel

4-Ft Supersonic Wind Tunnel

20-In Supersonic Wind Tunnel

Supersonic Low Disturbance Tunnel

8-Ft High Temperature Tunnel

Langley Aerothermodynamics Laboratory

Scramjet Test Complex

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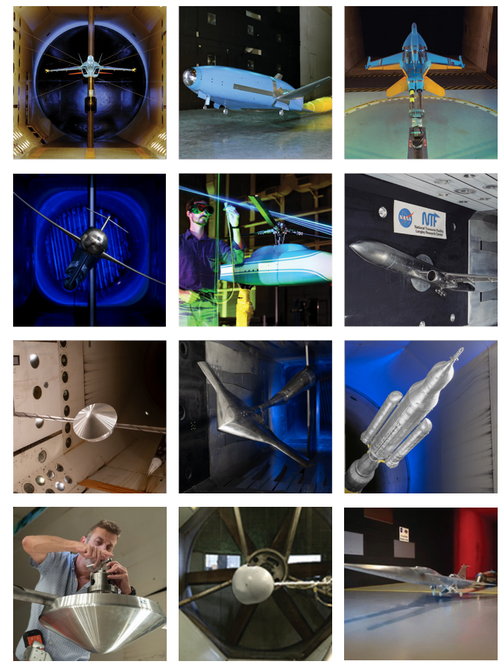
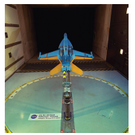
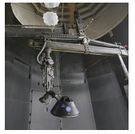
National Aeronautics and Space Administration

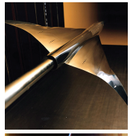
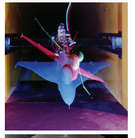
Wind Tunnel Testing Guide

at NASA Langley Research Center







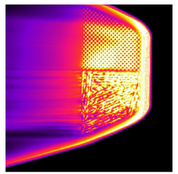

CAPABILITIES AT A GLANCE

Facility	Variables	Speed	Reynolds Number	Test Section Size	Total Pressure	Temperature	Test Gas	Type
SUBSONIC SPEED REGIME								
14- by 22-Foot Subsonic Tunnel (14x22)		Mach 0 to 0.3 (348 ft/s)	0 to 2.2 x 10^6 per ft	14.5'H x 21.75'W x 50'L	Atmospheric	Ambient	Air	Closed Circuit, Open or Closed Test Section
Low-Speed Aeroacoustic Wind Tunnel (LSAWT)	Round Nozzle: (76in) Square Nozzle: (54in)	Mach 0.046 to 0.143 Mach 0.100 to 0.320	0 to 2.2 x 10^6 per ft	17'H x 17'W x 34'L	Dual streams rated at 175 psi	Dual Streams up to 2000°F	Air	Open Circuit, Anechoic
Flight Dynamics Research Facility (FDRF)		0 to 172 ft/s (0 to 117 mph)	0 to 1.1 x 10^6 per ft	20'W (12-Sided) x 24'L	Atmospheric	Actively Cooled	Air	Closed Circuit, Open or Closed Test Section
TRANSONIC SPEED REGIME								
Transonic Dynamics Tunnel (TDT)	Air Mode: Heavy Gas Mode:	Mach 0 to 1.2 Mach 0 to 1.2	0.01 to 3.0 x 10^6 per ft 0.1 to 9.6 x 10^6 per ft	16' H x16'W x 30'L	0.5 psia to atm	70° to 130°F	Dry Air R-134a	Closed Circuit
National Transonic Facility (NTF)	Air Mode: Cryogenic:	Mach 0.1 to 1.05 Mach 0.1 to 1.20	1 to 23 x 10^6 per ft 4 to 145 x 10^6 per ft	8.2'H x 8.2'W x 25'L	14.7 to 120 psia	+70° to +130°F -250° to 130°F	Dry Air Nitrogen	Closed Circuit
0.3-Meter Transonic Cryogenic Tunnel (0.3-M TCT)	Air Mode: Cryogenic:	Mach 0.1 to 0.8 Mach 0.1 to 0.9	1 to 13 x 10^6 per ft 1 to 100 x 10^6 per ft	13"H x 13"W Adaptive Wall	14.7 to 65 psia 14.7 to 88 psia	120°F -280° to 80°F	Dry Air Nitrogen	Closed Circuit
SUPERSONIC SPEED REGIME								
4-Foot Supersonic Unitary Plan Wind Tunnel (UPWT)	Test Section 1: Test Section 2:	Mach 1.5 to 2.9 Mach 2.3 to 4.6	0.5 to 11.4 x 10^6 per ft 0.5 to 8.4 x 10^6 per ft	4'H x 4'W x 7'L	0 to 10 atm	100° to 300°F	Dry Air	Closed Circuit
High Speed Low Disturbance Facility (HSLD)								
20-Inch Supersonic Wind Tunnel (SWT)		Mach 1.6 to 5.0 (0.35 to 0.75 for airfoils)	0.05 to 20 x 10^6 per ft	20"H x 18"W	0.2 to 130 psia	75° to 200°F	Dry Air	Blow Down
Supersonic Low Disturbance Tunnel (SLDT)	Rectangular Nozzle: Axisymmetric Nozzle:	Mach 3.5	0.9-27.2 x 10^6 per ft	6"H by 10" W open jet 6.9" dia. open jet	10 to 150 psia	500 to 660°R	Dry Air	Blow Down
HYPERSONIC SPEED REGIME								
Langley Aerothermodynamics Laboratory (LAL)								
20-Inch Mach 6 Air Tunnel		Mach 6	0.5 to 8.0 x 10^6 per ft	20"H x 20.5"W	30 to 475 psia	760° to 940°R	Dry Air	Blow Down
15-Inch Mach 6 High Temperature Air Tunnel		Mach 6	0.5 to 6.0 x 10^6 per ft	14.6" diameter open jet	50 to 450 psia	970° to 1250°R	Dry Air	Blow Down
31-Inch Mach 10 Air Tunnel		Mach 10	0.5 to 2.2 x 10^6 per ft	31"H x 31"W	150 to 1450 psia	1850°R	Dry Air	Blow Down
8-Foot High Temperature Tunnel (8-ft HTT)		Mach 3.5, 4, 5, 6, 7	0.44 to 5.09 x 10^6 per ft	54.4" dia. Mach 3.5 70" dia. Mach 6 96" dia. Mach 4, 5, 7	50 to 4000 psia ❶	850° to 4000°R	Air ❷	Blow Down
Scramjet Test Complex (STC)								
Arc-Heated Scramjet Test Facility		Mach 2 to 8 *	0.035 to 2.2 x 10^6 per ft	10.89" square open jet	675 psia	2000° to 5200°R	Dry Air	Blow Down
Direct-Connect Supersonic Combustion Test Facility		Mach 3 to 7.5 *	2 to 8 x 10^6 per ft	❹	115 to 500 psia	1600° to 3800°R	Hydrogen/Air ❸	Blow Down

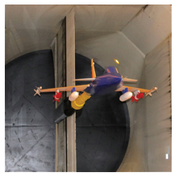
*Simulated

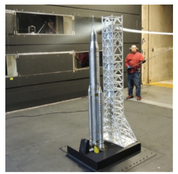
❶ Customer specifies altitude ❷ Vitiated Heater (air, methane, lox) ❸ Hydrogen-air combustion products with oxygen replenishment ❹ Two-dimensional nozzles: Mach 2.0 - 1.52"H x 3.46"W and Mach 2.7 - 1.50"H x 6.69"W

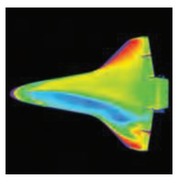
SAMPLE TEST CAPABILITIES

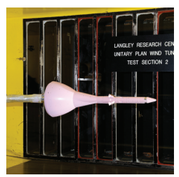

Infrared Flow Visual


Acoustic Testing


Aeroelastic Testing


Ground Wind Loads

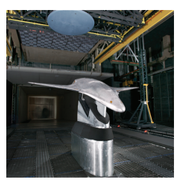

Aerothermal Testing


Temperature / Pressure Sensitive Paint


Forced Oscillation Testing


Pressure Model Testing

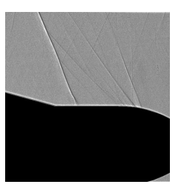

Stability and Control
High Angle-of-Attack Testing


Propulsion Airframe
Aeroacoustic Testing


Propulsion System Testing
Jet Effects Testing


Performance Testing


Rotorcraft Testing


Shadowgraph Flow Visual


Semi-Span Testing

- Advanced Forced Balances
- Dynamic Data Systems
- Dynamically-Scaled Free Flight
- Ground Effects
- IR Thermography
- High-Speed Schlieren and Shadowgraph
- Background-Oriented & Focused Schlieren
- Particle Image / Tracking Velocimetry