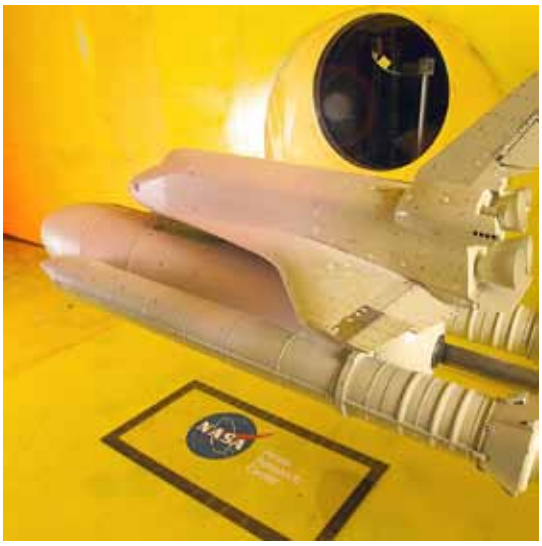
National Aeronautics and Space Administration

NASA's **Aeronautics Test Program**

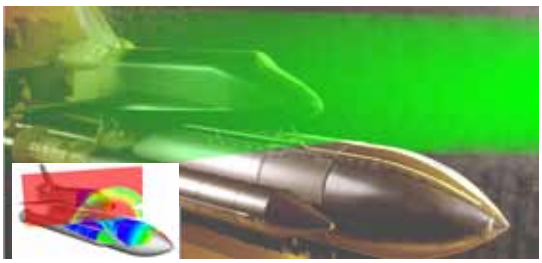
9- by 7-Foot Supersonic Wind Tunnel

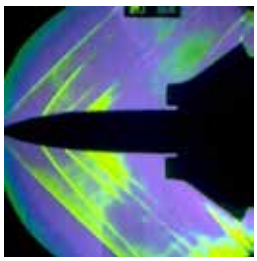
The 9- by 7-Foot Supersonic Wind Tunnel (9×7 SWT) facility is part of the Unitary Plan Wind Tunnel (UPWT) complex at NASA Ames Research Center at Moffett Field, California, where generations of commercial and military aircraft and NASA space vehicles, including the space shuttle, have been designed and tested.

The 9×7 SWT is a closed-return, variable-density tunnel with an asymmetric, sliding-block nozzle. It is one of three separate test sections powered by a common drive system. Interchangeability of models among the UPWT test sections allows testing across a wide range of conditions. Airflow is generated by an 11-stage, axial-flow compressor powered by four variable-speed, wound-rotor induction motors.



The 9×7 SWT continues to provide aerodynamic data for NASA's manned spaceflight efforts, including the Constellation Program, whose goal it is to create the rockets and spacecraft necessary to take explorers to Earth orbit, the Moon, and eventually, to Mars.





Facility Benefits

- Excellent optical access supports advanced flow techniques, including pressure-sensitive paint, particle image velocimetry, oil flow interferometry, infrared thermography, and Schlieren imaging
- Rear-sting model support provides wings-level yaw capability
- High-pressure air at 3000 psi is digitally controlled with preheating available and over 6 million scf of storage
- A steady-state data system incorporates the latest technology in a flexible, modular configuration to satisfy the most demanding test configurations, with the capability of acquiring pitch-pause and continuous-sweep data
- Onsite instrumentation measures balance loads, model position, thermally compensated surface pressures, temperatures, and tunnel conditions
- An extensive library of standard aerodynamic computations is augmented by the ability to easily add customer-defined equations; corrections include wall interference and buoyancy
- A dynamic data system acquires more than 100 channels of dynamic and transient data, including unsteady pressures, acoustics, and dynamic structural loads

Facility Applications

- Commercial, military, and NASA programs

Data Acquisition and Processing

Steady-State Data		
System	Channels	Sample frequency
Analog input	48	1000 Hz
Digital input	16	Test dependent
Force balances	32	1000 Hz
Pressure	2048	20 Hz
Temperature	60	10 Hz
Time Variant Data, High Speed		
System	Channels	Sample frequency
Analog	160	20-KHz bandwidth
Force balance	160	80-KHz bandwidth

Classified capability available.

Characteristics

Test section dimensions	7 ft high by 9 ft wide by 14 ft long
Area	63 ft^2
Speed	Mach 1.55 to 2.55
Reynolds number	0.90 to 5.6×10^6 per ft
Temperature	110±20 °F
Pressure	4.4 to 27 psi
Test gas	Air

Instrumentation

Strain gauge balances	Six component
Angle-of-attack (AOA) accelerometers	±15° with offsets to +25°

Contact Information

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