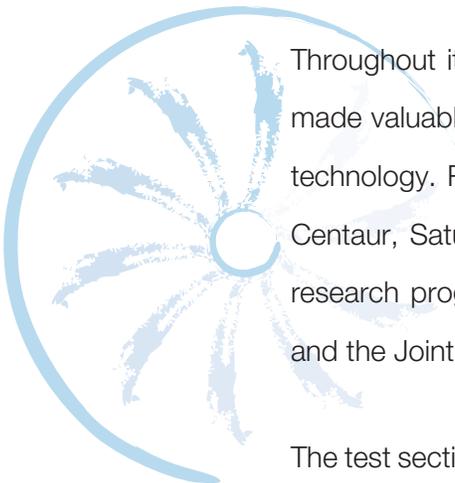




NASA's Aeronautics Test Program

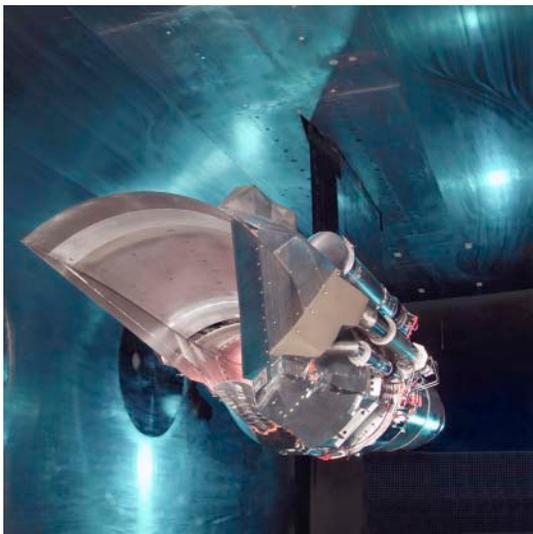
10- by 10-Foot Supersonic Wind Tunnel

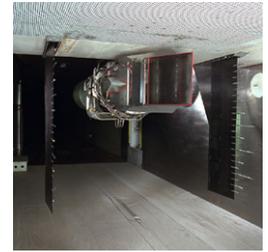
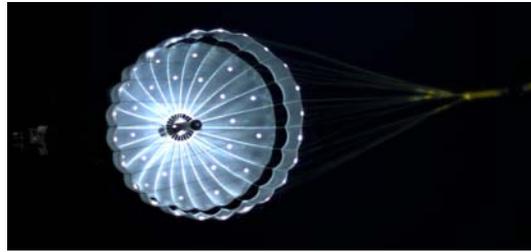
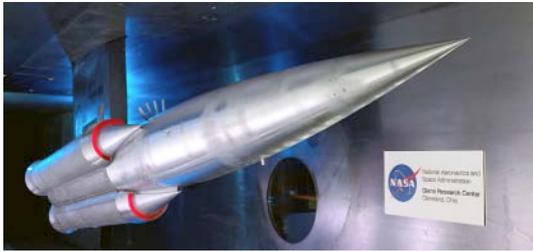


Throughout its history, the 10- by 10-Foot Supersonic Wind Tunnel (10x10 SWT) has made valuable contributions to the advancement of fundamental supersonic propulsion technology. Researchers have used the facility to aid in the development of the Atlas-Centaur, Saturn, and Atlas-Agena-class launch vehicles, and for such vehicle-focused research programs as the High-Speed Civil Transport, the National AeroSpace Plane, and the Joint Strike Fighter.

The test section is large enough to accommodate large-scale models and full-size aircraft components. The 10x10 SWT was specifically designed to test supersonic propulsion components such as inlets, nozzles, and full-scale jet and rocket engines. It also has been effectively utilized for force balances models and spacecraft reentry decelerator testing.

From left to right: Parametric inlet model, operators monitor a test from the control room, Active Inlet Flow Control (AIFC) fan and bellmouth installed in test section, and Mach 5 inlet.





Facility Benefits

- Equipped with model support systems (hydraulics, exhaust, high-pressure air, fuels, etc.)
- Able to accommodate large-scale models and full-size aircraft components
- Offers continuous operation across the entire speed and altitude regime, allowing greater flexibility and productivity during testing
- Capable of expanding local Mach number range with gust and Mach plates
- Employs an experienced staff of technicians, engineers, researchers, and operators

Facility Applications

- Development of launch vehicles
- Aircraft and missile development
- Inlet performance and operability
- Propulsion system integration
- Jet and rocket engines
- Supported programs and projects including the High-Speed Civil Transport, National AeroSpace Plane (NASP), space shuttle, and Joint Strike Fighter (JSF)
- Entry, Descent and Landing (EDL) technology development for parachutes and inflatable decelerators.

Characteristics

Test section dimensions	10 ft high by 10 ft wide by 40 ft long	
Speed	Mach 0 to 0.36 and 2.0 to 3.5	
	Aerodynamic cycle	Propulsion cycle
Simulated altitude	50 000 to 154 000 ft	57 000 to 77 000 ft
Reynolds number	0.1 to 3.4×10^6 per ft	2.2 to 2.7×10^6 per ft
Dynamic pressure	20 to 720 psf	500 to 600 psf
Temperature	540 to 750 °R	520 to 1140 °R
Fuels	Liquid jet fuel, gaseous hydrogen, and gaseous oxygen	

Instrumentation

Pressure measurement	
Electronically scanned pressure (ESP) system	768 ports, ± 15 psid 192 ports, ± 30 psid
Temperature measurement	
Thermocouples	48 (type J, T, or R)
Flow visualization/optical techniques	Schlieren system, sheet laser, pressure-sensitive paint, high-speed video, and Particle Image Velocimetry (PIV)

Data Acquisition and Processing

Steady state ESCORT	Real-time acquisition and display of engineering unit converted data as well as the resultant calculations in tabular or graphical formats at an update rate of 1 to 2 per sec. Custom application-specific features are available upon request.
Dynamic Multichannel high-speed digitized acquisition	Acquisition of engineering unit converted data and calculations with real-time tabular, X-Y, FFT, scope, and other displays. 24-bit sigma-delta analog to digital per channel with data rates of up to 200-k samples/sec give high-frequency response, resolution, and signal-to-noise ratios. Near real-time transfer of data to customers in standard or custom data formats.
Remote access control room	Real-time remote access to data through secure network connections.

Contact Information

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