National Transonic Facility Site Dedication

July 19, 1977
11:00 a.m.

Langley Research Center
National Transonic Facility
Site Dedication

Aircraft Display
BOEING 737 TRANSPORT

Short-range, twin-engine transport designed for short-field operation (4,000 ft.). Typical gross weight 115,000 pounds; payload of 115-130 passengers.

Technology Application

- Advanced high-lift flap system for short-field operation.
- Under-wing propulsion system integration.
- Flight/wind tunnel correlation tests performed in Langley 16-Foot Transonic Tunnel.
USAF T-38 (Northrop)

Light-weight, twin-engine trainer having supersonic capability (M = 1.34; 890 mph) with a service ceiling of 52,000 ft. Variants of the F-5/T-38 are in military service in over twenty countries.

Technology Application

- Advanced supersonic trainer utilizing the "Area-Rule" concept for an unswept wing.
- Wing utilizes supersonic airfoil sections with leading edge flaps to provide high performance throughout the speed spectrum.

UH – IH IROQUOIS (Bell)

Turbine-powered utility helicopter carries 14 passengers at 130 mph. Used for rotor research at Langley. Gross weight 9500 pounds.

Technology Application

- "Ogee" blade tip reduces strength of tip vortex at transonic rotor speeds.
- Leads to reduction in noise and blade dynamic loads with improved vehicle performance.
USA F-15 EAGLE (McDonnell Douglas)

High performance, single-seat fighter. Gross weight 40,000 pounds; maximum speed \( M = 2.5 \) (1650 mph); absolute ceiling 67,000 ft.

Technology Application

- Evolved from NASA LFA X Fighter studies.
- Transonic/supersonic aerodynamic integration.
- NASA/Langley provided 7000 wind-tunnel hours for flutter validation, high – a maneuverability, spin recovery, and engine nozzle/afterbody refinement.

USA F-106 DELTA DART (CONVAIR)

Single-seat, supersonic interceptor employs a 60-degree delta wing. Gross weight 42,000 pounds, maximum speed \( M = 2.34 \) (1525 mph), service ceiling 57,000 ft.

The F-106, introduced in 1959, is the first-line interceptor of the Aerospace Defense Command.

Technology Application

- First aircraft to incorporate “Area-Rule” concept in basic design.
- Conical wing camber improves subsonic performance without degrading supersonic capability.
U.S. NAVY F-14 TOMCAT (Grumman)

High-performance, twin-engine, carrier-based fighter employing a variable-sweep wing to fulfill both “dogfight” and air defense roles. Gross weight 55,000 to 70,000 pounds; maximum speed $M = 2.34$ (1550 mph).

Technology Application

- Variable-sweep wing evolved from X-5 research aircraft and Langley wind-tunnel studies.
- NASA/Langley provided 11,000 wind-tunnel hours for flutter validation, propulsion system integration, high -$\alpha$ maneuverability, and spin recovery.

McDONNELL DOUGLAS DC-10

A wide-body, 3-engine jet transport designed for intermediate range and low community noise. Typical gross weight 550,000 pounds; payload of 250-380 passengers or 150,000 pounds of freight.

Technology Application

- Supercritical-type wing, advanced high-lift flap system, AFT engine aerodynamic integration.
- Flutter validation tests of vertical tail assembly performed in Langley Transonic Dynamics Tunnel.
GATES LEARJET BUSINESS TRANSPORT

This aircraft is typical of high-performance, twin-jet business aircraft (1775 currently registered in U.S.). Gross weight approximately 15,000 pounds, 4-6 passengers, cruise speed $M = 0.81$ (540 mph) with transcontinental range.

BOEING 747 TRANSPORT

First of the wide-body jet transports designed for long range and low community noise. Typical gross weight 800,000 pounds; payload of 375-500 passengers or 200,000 pounds of freight.

Technology Application

- High-speed transport technology applied to business jet aircraft.
- Future designs incorporate supercritical airfoils, winglets, and "Area-Rule" integrated configurations.

Technology Application

- Supercritical-type wing, advanced high-lift flap system, "Area-Rule" fuselage.
- Flutter validation tests performed in Langley Transonic Dynamics Tunnel.