

NASA's Quesst Mission: Overview

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Presentation topics

- NASA Aeronautics Transformations
- Minimizing sonic boom sound
- Quesst mission background
- Mission overview
- Defining community response
- Setting a Standard
- Concluding remarks





ULTRA-EFFICIENT AIRLINERS



FUTURE AIRSPACE AND SAFETY



HIGH-SPEED COMMERCIAL FLIGHT



ADVANCED AIR MOBILITY

Quiet supersonic design

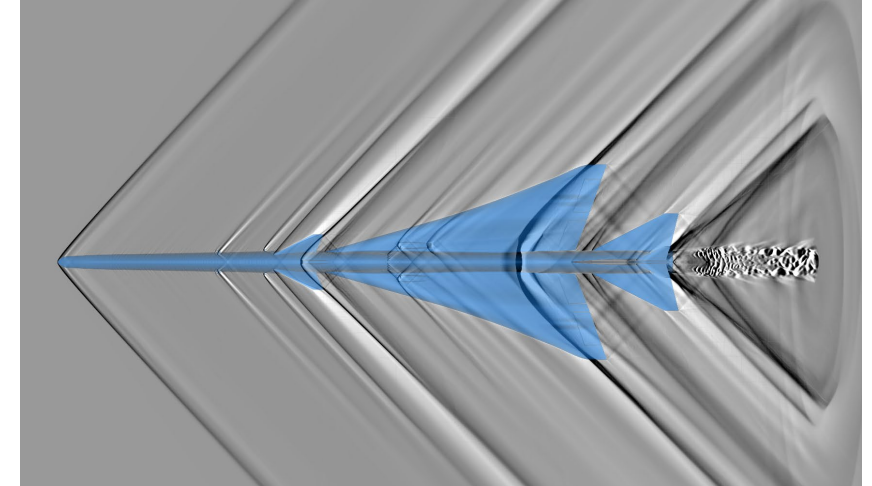


Acoustic pressure wave is “shaped” by controlling the strength and position of shock waves generated by aircraft components

Important advances:

- Higher fidelity analysis
- Integrated design systems
- Faster computers
- Innovating thinking

Design approaches originally developed in studies of airliner size concepts



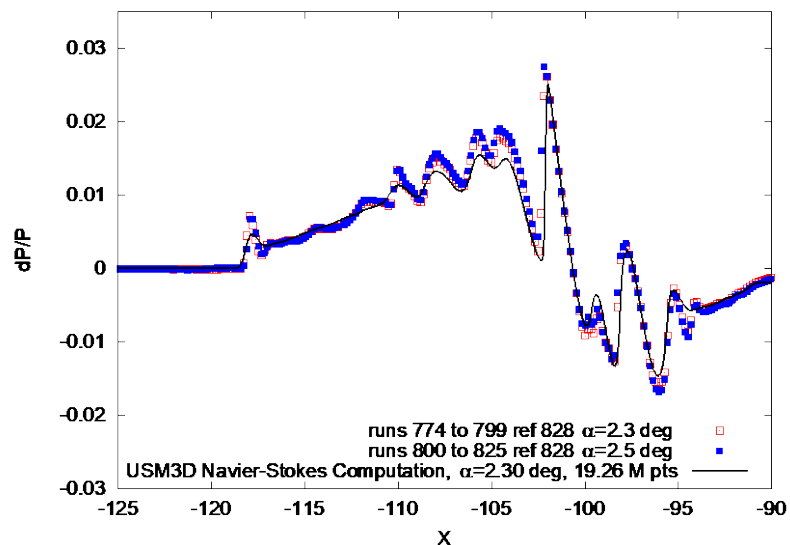
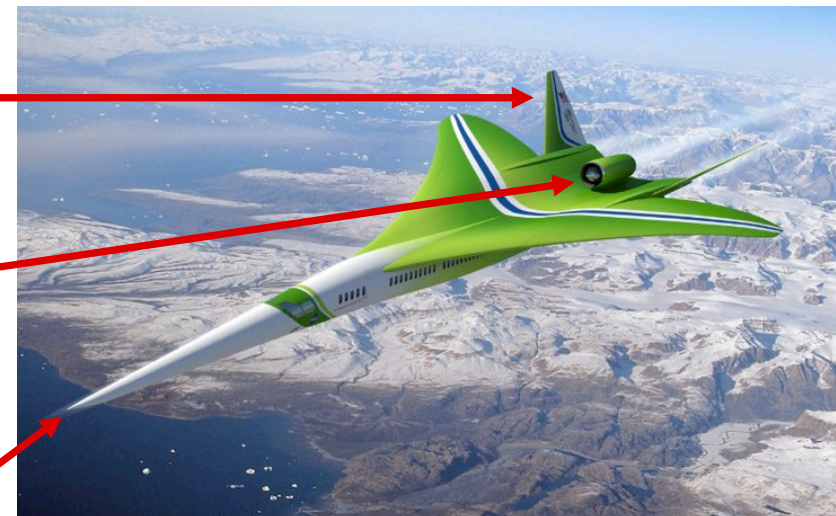
Breakthrough: Quiet, practical supersonic airliner designs



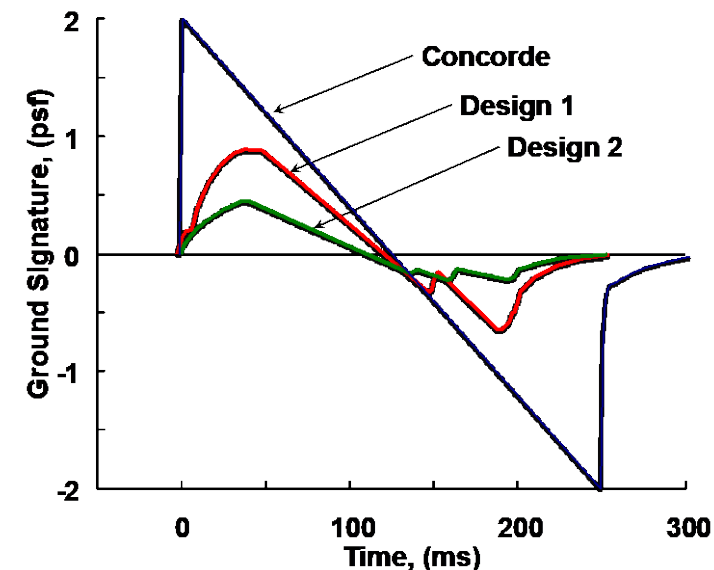
Unique empennage shape to control lift impact on signature

Propulsion installation minimizes contribution to signature

Integrated 3-D design of fuselage shape, wing planform camber & thickness



Wind tunnel/analysis comparison



Ground signature comparison

Why do we think the “thump” is quiet enough?

Indoor human response and annoyance is the main concern for public acceptance



Laboratory Tests



Small Community Tests

Quiet Supersonic Flights 2018 Galveston, Texas



Large Community
Risk Reduction

- Tests of increasing complexity have provided preparation and confidence
- Ready to take the next step with flight testing over very large communities

Overcoming the barrier to overland flight

Quesst Mission Goal:

Collect internationally accepted data to support ICAO-CAEP effort to develop an En Route Noise Standard

- **An En route Noise Standard is required**
 - Replace current prohibitions
 - Create relevant data to define limits
 - Community data from large, diverse population
 - Accepted internationally

Quesst mission overview

A high-angle, rear-quarter view of the X-59 Research Aircraft in flight. The aircraft is white with red and blue stripes along the fuselage and wings. It has a long, slender nose and a large, curved wing. The tail section features the NASA logo and the number 859. The aircraft is flying over a landscape with green fields and a blue body of water, with white clouds in the sky. The aircraft's engines are visible at the rear, and a bright orange flame is coming out of the left engine.

Use the X-59 Research Aircraft to gather data on community response to quiet supersonic flight

Phase 1: Research Aircraft Development (2018-25)

- Design, fabrication, ground test, and envelope expansion

Phase 2: Acoustic Validation (2026)

- Detailed ground and flight measurement to prove design

Phase 3: Community Response Testing (2027)

- Overflights, sound measurement, surveys

Community test requirements drove the X-59 design

- The acoustic signal must effectively replicate that of future larger supersonic commercial aircraft.
- The X-plane must conduct community overflight tests using normal commercial aircraft flight maneuvers.

Community overflight testing to create a response database



Developing an International Standard

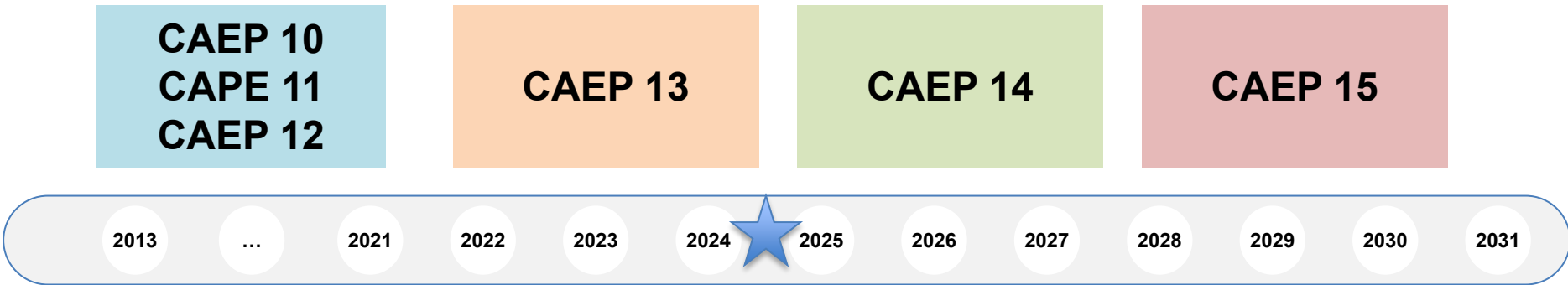


International Civil Aviation Organization Committee on Aviation Environmental Protection “ICAO-CAEP”

- CAEP operates in 3 year cycles
- Work plans adopted at start of the cycle
- Decisions adopted at end of cycle
- Data must be delivered with time for deliberation
- U.S. FAA harmonizes with CAEP Standards

CAEP engaged in the development of a standard for sound levels from supersonic overland flight

- Metrics, reference conditions, instrumentation, procedures and limits



NASA data supports CAEP Standards development

- Acoustic Simulator Testing, Atmospheric Characterization, Quesst Acoustic Validation data, Quesst Community Response data

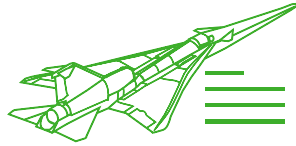
International data supports CAEP Standards development

- Acoustic Simulator Testing, Atmospheric Characterization,
- *Community Response data?*

Concluding remarks



A practical approach to reducing sonic boom sound has been developed



The Quesst mission will use the X-59 aircraft to gather data critical to overcoming the technical and regulatory barriers to quiet supersonic flight over land



The Quesst team is actively working on preparing three mission phases

- Aircraft Development
- Acoustic Validation
- Community Testing



NASA is engaged with the FAA and ICAO in the development of an international standard for sound levels for supersonic overland flight

- Quesst data can inform all elements of a new international standard



NASA seeks the broadest possible engagement with the international research and regulatory community to support acceptance of Quesst results



Questions?

For more information on the Quesst mission, visit www.nasa.gov/quesst