



An Overview of the Gulfstream
**Supersonic Technology
Program**



Gulfstream Aerospace Corporation

FAA Public Meeting – Supersonics

April 21, 2010 / Baltimore, MD

Civil Supersonics / Concorde is Gone – What Now?

- **Gulfstream Perspective...
Quiet Supersonic Jet (QSJ)**

- **Different Market**

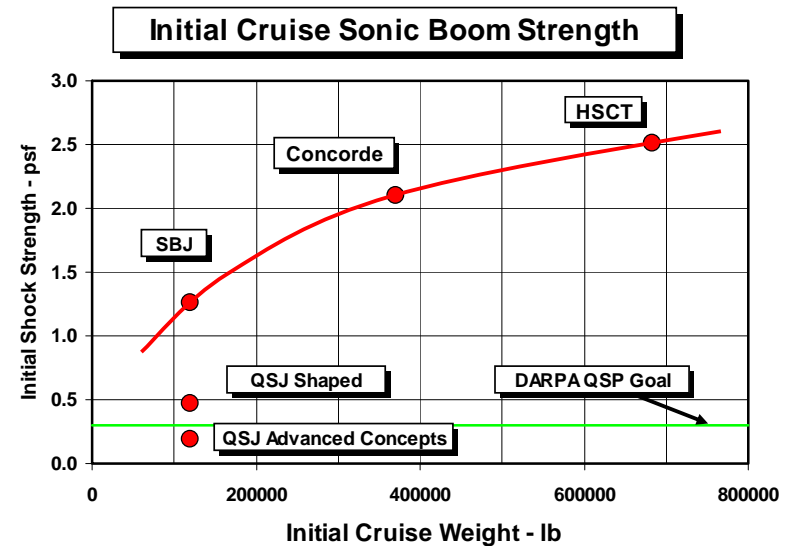
- **Business Jet: Speed is Important & Affordable**

- **Different Requirements**

- **High Speed Civil Transport: Mach 2.4, 600K airliner**
- **Quiet Supersonic Jet: Mach 1.8, 100K transport**

- **Advantages**

- **Smaller Aircraft** → **Reduced Sonic Boom**
- **Lower Speed** → **Less Complexity (Inlets, Materials, Etc.)**



Better Chance at Enabling Acceptable Supersonic Civil Aircraft

Redefining the Speed Envelope



Cruise Speed **0.90 M**

←—————→ **1.80 M**

Environmental Considerations

- Boom Overpressure
- Takeoff Emissions
- Cruise Emissions
- Airport Noise

Requirement

Acceptable for Overland SS Flight

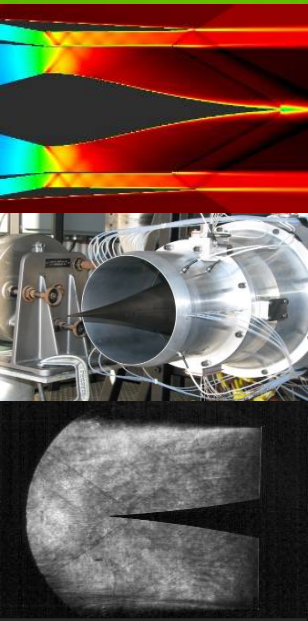
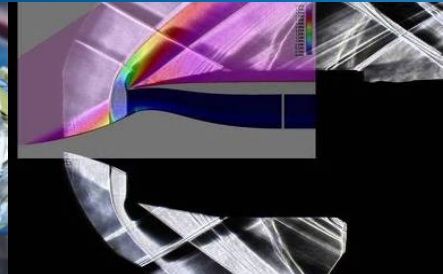
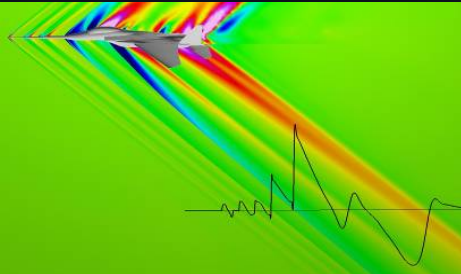
ICAO with Margin

Minimum Impact

Stage 4 with 10dB Margin

Manage Environmental Impacts Through Design Requirements

Supersonic Technology Development

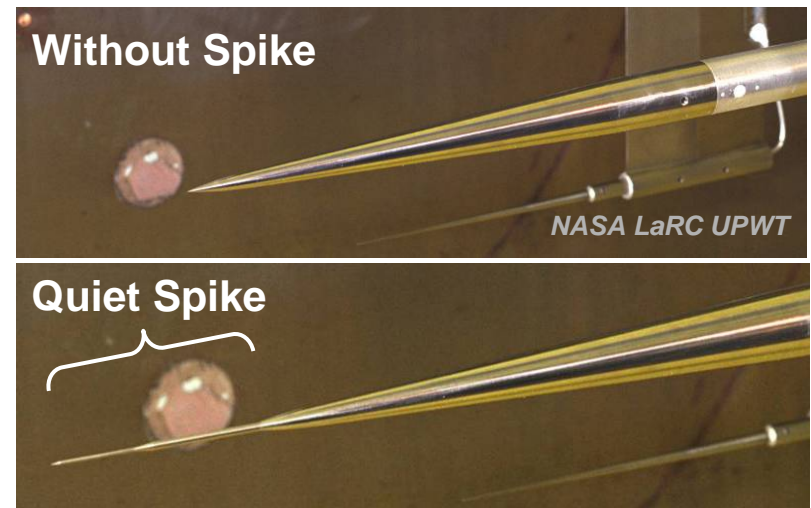
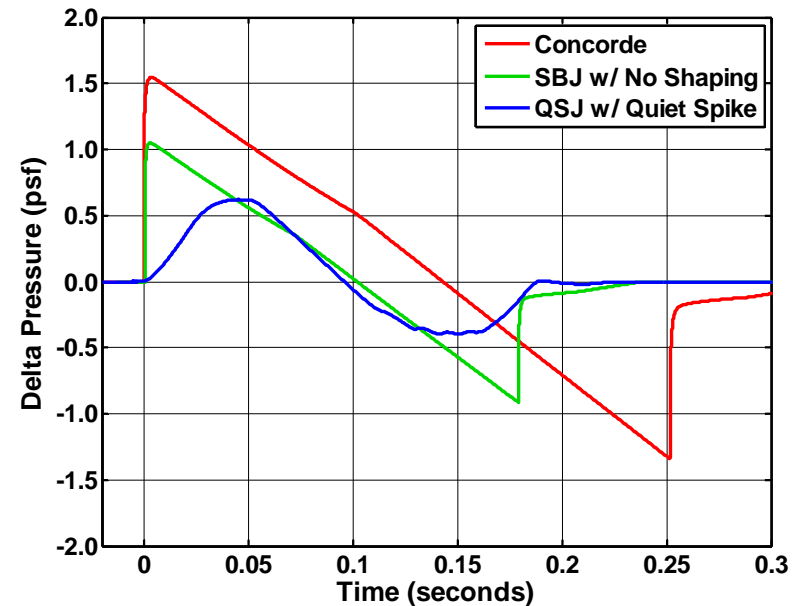


Objective: Conduct basic research into reducing the impact of sonic boom on people and the environment to enable regulatory change for supersonic flight overland, domestically and internationally



Sonic Boom Suppression

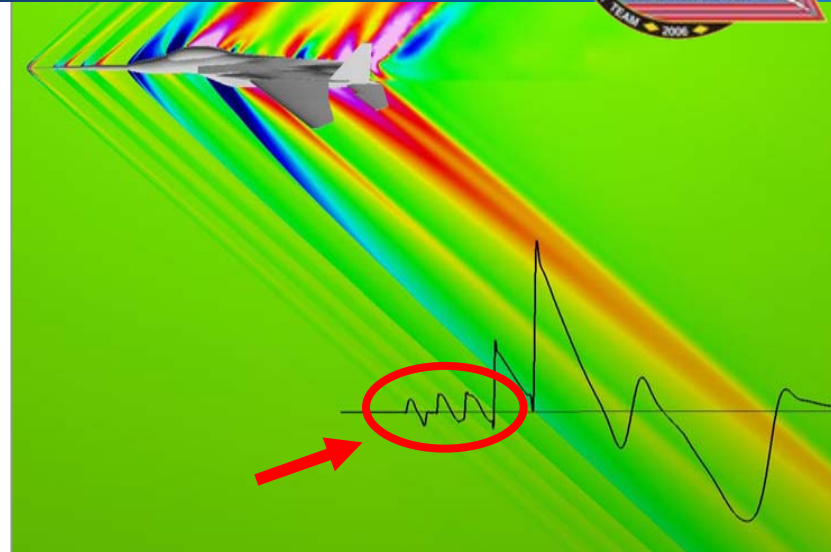
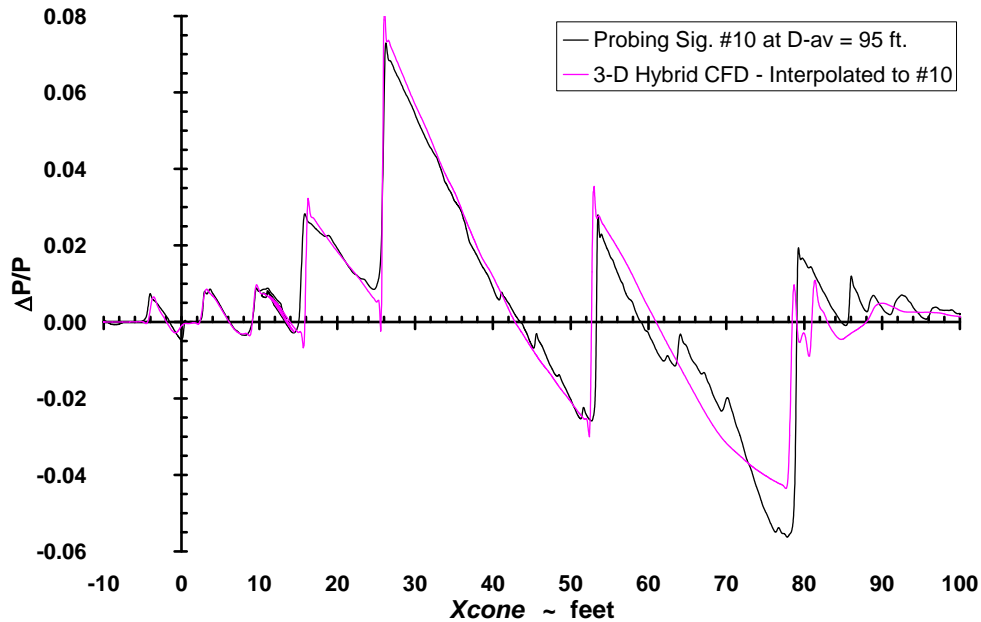
- **Gulfstream Quiet Spike™**
 - Extendable Nose Spike
 - Generate Series Of Weak Shocks
 - Propagate Parallel To Each Other
 - Transform Sharp Crack Into Quiet Whisper



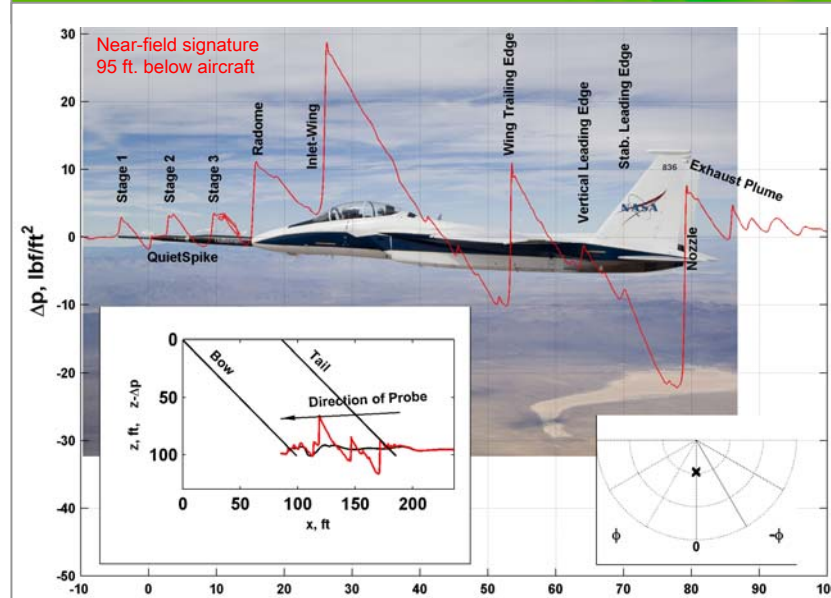
Quiet Spike™ Flight Test



Comparison of CFD-Predicted vs. Measured Near-field Signature

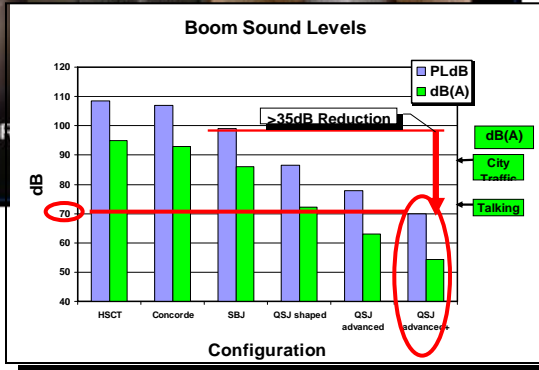
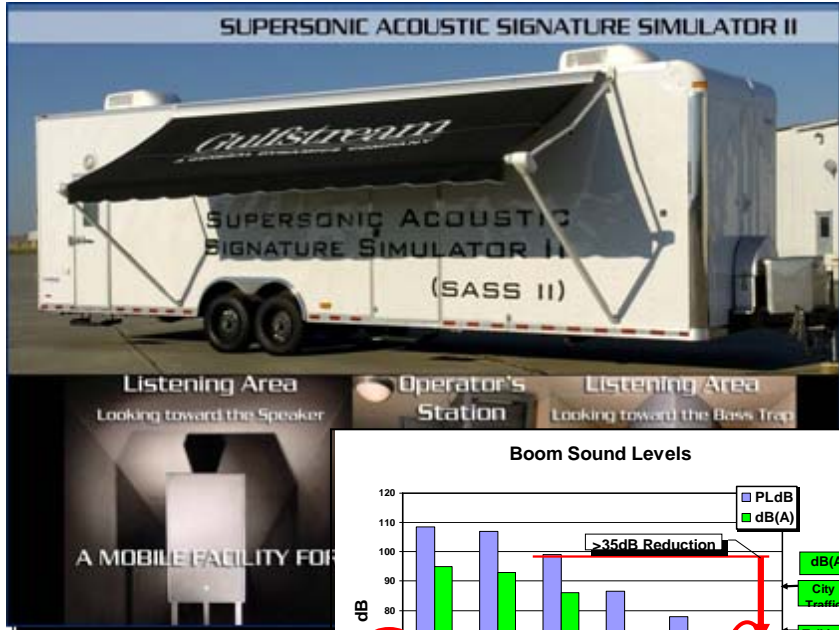


Excellent Correlation & Validation of Sonic Boom Suppression

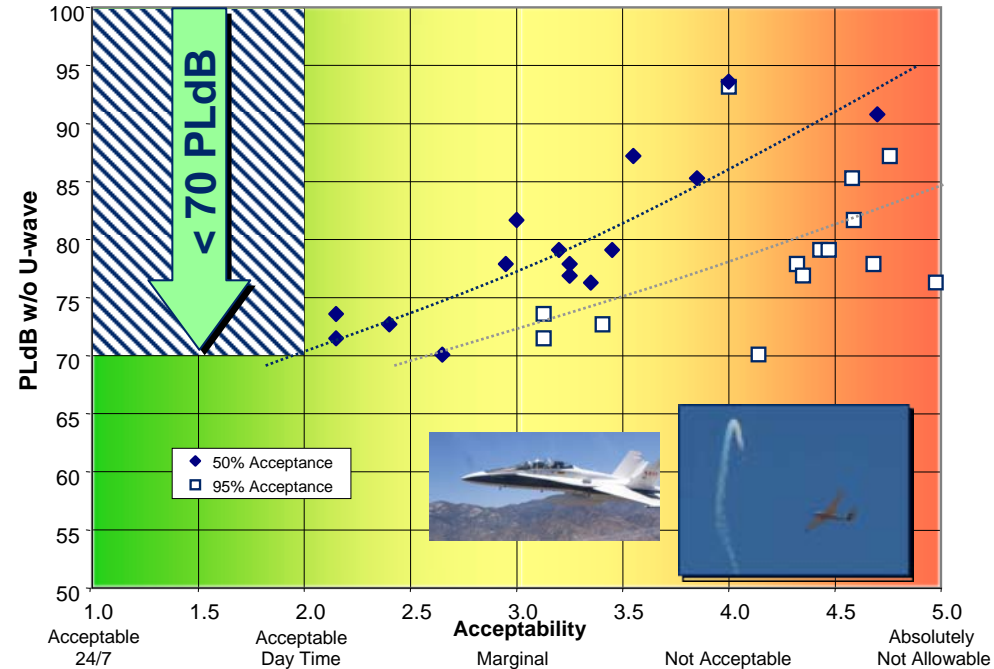


Preliminary Outdoor Loudness Assessment

Gulfstream Signature Development & Simulation

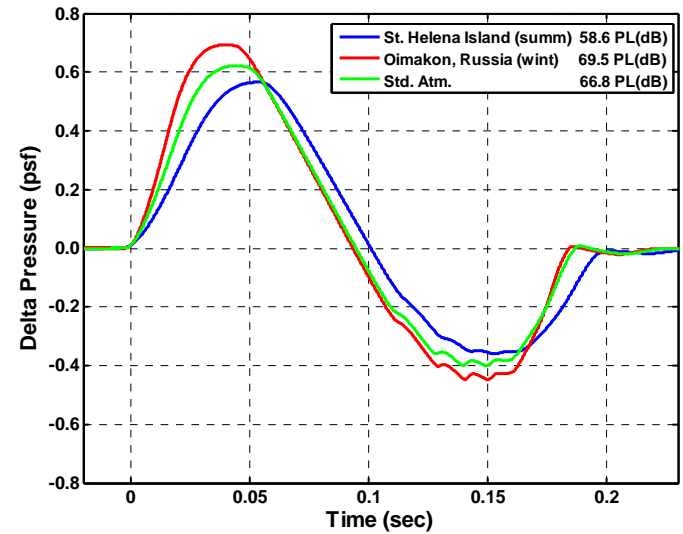
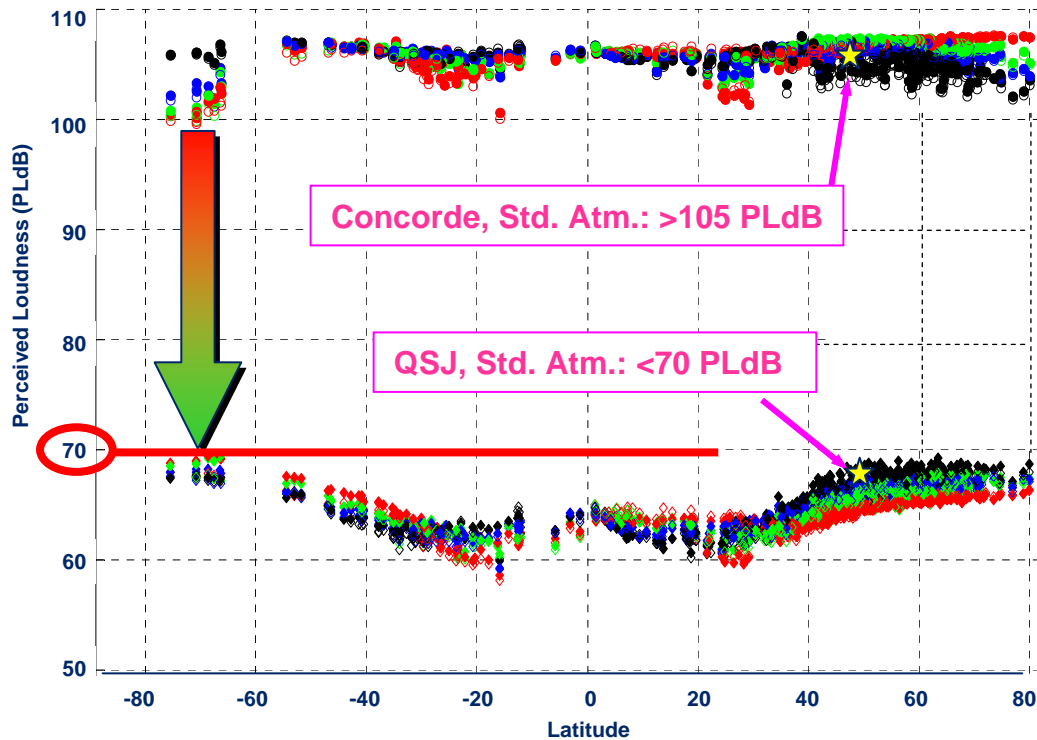


NASA F-18 Low Boom Flight Test – October 2005

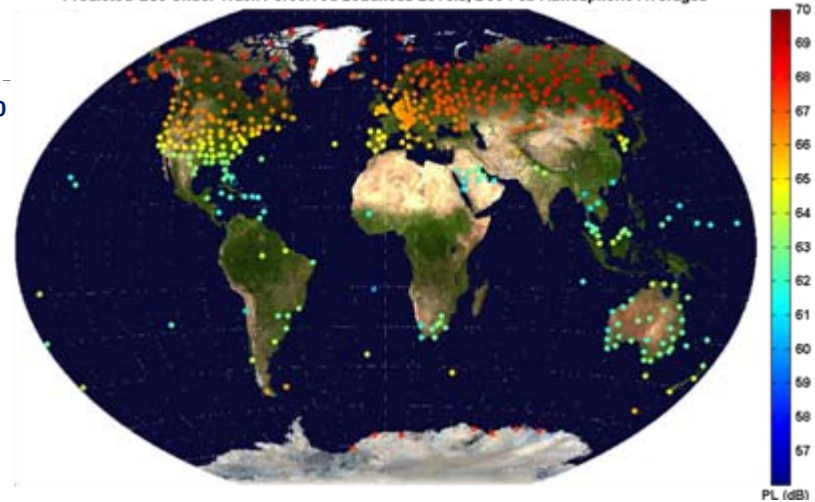


Low Boom Simulation & Preliminary Flight Results Independently Point Toward Signature Levels ~ 70 PLdB

Global Impact Assessment



Predicted QSJ Under Track Perceived Loudness Levels, Dec-Feb Atmospheric Averages



**Low Boom Signature
Robust in Non-Standard
Atmosphere**

Summary

- **Continued Market / Industry Interest in Future Supersonic Concepts**
 - **Supersonic Overland Flight is Required**
 - **Manage Environmental Design Requirements for Success**
- **Promising Research Results in Sonic Boom Suppression**
 - **Validated Quiet Spike Technology**
 - **Acceptable Noise Level Achieved Through Low Boom Shaping**

Quiet Spike Video



Questions ?



Listening Area

Looking toward the Speaker



Operator's Station



Listening Area

Looking toward the Bass Trap



A MOBILE FACILITY FOR ASSESSING SIGNATURE ACCEPTABILITY