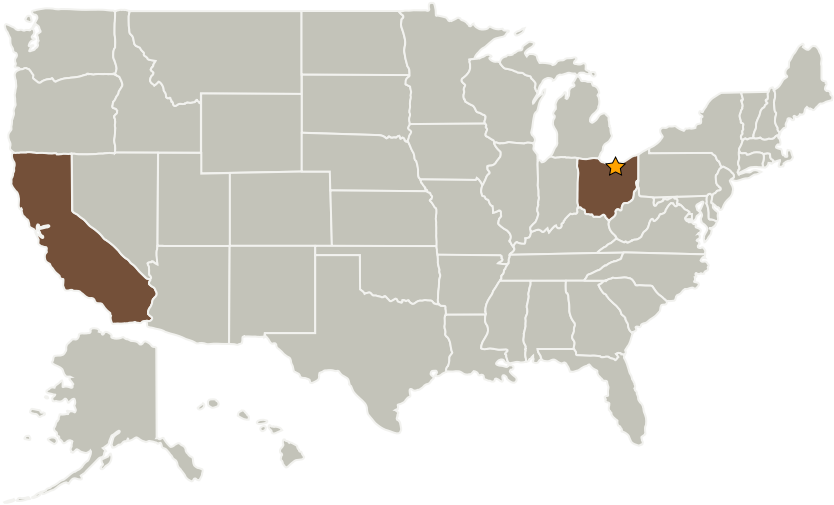
Development of an Engine Air-Brake for Quiet Drag Applications, Phase II

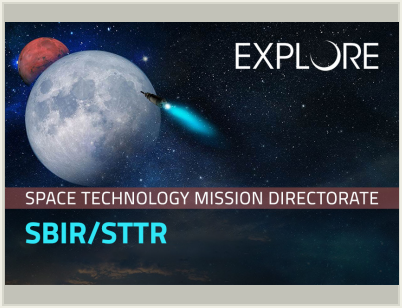
Completed Technology Project (2009 - 2011)

Project Introduction

A novel quiet engine air-brake (EAB) is proposed in response to NASA's solicitation for active and passive noise control concepts for conventional and advanced aircraft. The EAB concept is applicable to 1) next-generation, conventional tube and wing aircraft (current generation +1) and 2) advanced integrated airframe/propulsion system configurations (current generation +2, +3). Potential retrofit opportunities are also envisioned. Phase 1 analysis on NASA's Source Diagnostic Test (SDT) fan stage suggests that an EAB could realize three to four decibels overall noise reduction under the approach flight path by generating a swirling exhaust with drag equivalent to one to two turbofan-sized bluff bodies per powerplant. Such drag generation could enable slower and/or steeper and/or aero-acoustically cleaner approach trajectories. A Phase II development program is proposed to 1) perform aerodynamic designs of dual-stream, swirling bypass flow nozzles and experimentally assess their performance and noise, 2) develop conceptual aero-designs that address current engine architecture issues such as pylon duct bifurcations, and 3) develop a prototype design of an EAB for validation in a model-scale rig. The final deliverable to NASA will be a written report presenting design, analysis and experimental results from blown nozzle testing, plus a prototype EAB design.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
ATA Engineering, Inc.	Supporting Organization	Industry	San Diego, California

Primary U.S. Work Locations	
California	Ohio

Project Transitions

April 2009: Project Start

September 2011: Closed out

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX15 Flight Vehicle Systems
  └ TX15.1 Aerosciences
    └ TX15.1.4 Aeroacoustics