Flight Dynamics and Control Research at NASA Langley Research Center (LaRC)

Jared A. Grauer
NASA Langley Research Center

Aerospace Control and Guidance Systems Committee
Meeting #136
Virtual
8—9 April 2026

Research Directorate (RD) Hierarchical Structure

2/8/2026

RESEARCH DIRECTORATE

RESEARCH DIRECTORATE (D3)

Jill Prince*, Director
Jennifer Kibler*, Deputy Director
David Shinn*, Chief Operations Officer

Aerosciences
Vacant
Deputy Director for
Michael Doty*,
Associate Director for Research
Robert Scott,
Associate Director for Operations
Beth Lee-Rausch,
Chief Engineer for

Structures & Materials
Vacant
Deputy Director for
Martin Annett,
Associate Director for
Theodore (Ted) Johnson,
Chief Engineer for

Intelligent Flight Systems
Jack Ryan*,
Deputy Director
Gary Kellogg,
Associate Director
Vacant,
Chief Engineer for

Michael Madden, Chief Engineer for Modeling & Simulation
Eric Walker, Chief Engineer for Test Operation Excellence
William (Tony) Humphreys, Chief Engineer for Measurement Systems
Anthony Washburn, Chief Technologist
Joseph Patterson, Senior Safety Engineer

Technical Resource Management Team
Vincent Le Boffe: LMS & Software Mgr. & CMOE DCOR
Kerry Gumbs: IT Safety Manager
Jennifer Kibler: Early Career Cohort Supervisor
Michael Ferens: RF Manager

D301 Configuration Aerodynamics
David Chan, Head
Vacant, Asst. Head

D302 Computational AeroSciences
David Lockard, Head
Vacant, Asst. Head
Mujeeb Malik, Computational Aerodynamics ST

D303 (D304) Flow Physics & Control (new name tbd)
Luther Jenkins, Head
Shelly Sadowski, Asst. Head
Paul Danehy, Adv. Measurements ST

D305 Aerothermodynamics
Kelly Murphy, Head
Bill Wood, Asst. Head
Bil Kleb, Computational Aerothermodynamics ST

D306 Hypersonic Airbreathing Propulsion
Richard Gaffney, Head
Robin Hunt, Asst. Head

D308 Aeroelasticity
David Piatak, Head
Vacant, Asst. Head

D314 Flight Vehicle Acoustics
Christopher Bahr*, Head
Douglas Nark, Asst. Head
Nikolas Zawodny, Asst. Head (Acting)
Steve Rizzi, Aeroacoustics ST

D34 Aerosciences Operations Section
Kevin Harrell, Deputy Associate Director
Bob Edwards, Group Chief
Jason Healy, Group Chief
Brian Overbay, Group Chief
Vacant, Group Chief

D341 Test Technologies
Shawn Britton, Head

D307 Advanced Materials & Processing
Catharine Fay, Head
Chris Wohl, Asst Head
Vacant, *Advanced Materials ST*

D309 Durability, Damage Tolerance, & Reliability
Frank Leone, Head
Ryan Norman, Asst. Head
Ed Glaessgen, Computational Materials ST

D312 Structural Mechanics & Concepts
Adam Przekop, Head
Marc Schultz*, Asst. Head
David Glass, Adv Structural/Thermal Systems ST

D313 Nondestructive Evaluation Sciences
Jason Moore, Head
Vacant, Asst. Head

D322 Structural Dynamics
Matthew Chamberlain, Head
Vacant, Asst. Head

D325 Materials & Structures Experiments
Vacant, Head
Eli Etheridge, Asst. Head

D316 Vehicle Dynamics and Control
Oscar Murillo, Head
Corey Diebler, Asst. Head
Vacant, *Advanced Controls ST*

D318 Crew Systems & Aviation Ops.
Lisa Le Vie, Head
Keith Arthur, Asst. Head

D320 Safety-Critical Avionics Sys.
Aaron Dutle, Head
Natasha Neogi, Intelligent Flight Systems ST

D331 Revolutionary Aviation Technologies
Scott Luers, Head

D332 Autonomous Integrated Systems Research
Trey Arthur, Head

AO/Administrative Team
(Matrixed from OD)
Lisa Peckham: Lead AO

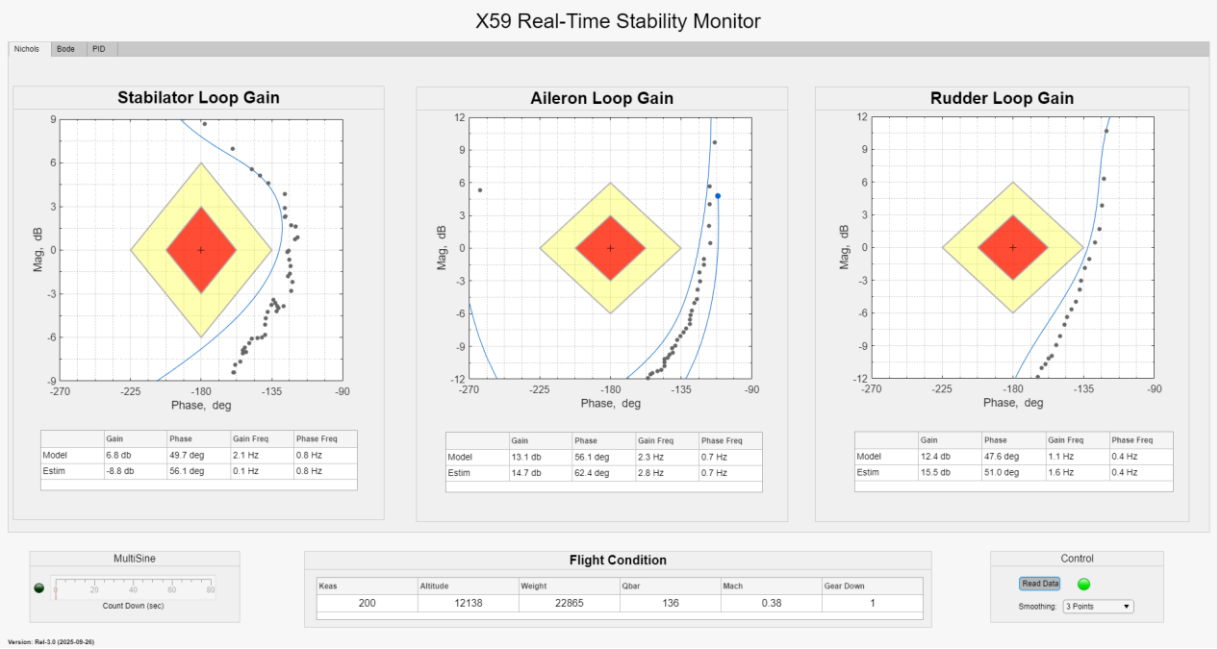
Business Team
(Matrixed from OCFO)
Heather Angle: Business Manager

COR
(Matrixed from SPO)
Eddie Adcock: Lead RSES COR

* Acting

X-59 Low Boom Flight Demonstrator (LBFD)

- Supporting X-59 flight testing at NASA AFRC
- Phase I testing to clear the flight envelope
- NASA LaRC supporting a variety of tasks:
  - Real-time and post-flight stability margin estimation
  - Real-time and post-flight estimation of stability and control derivatives
  - Multisine input excitation design
  - Flying qualities assessment through low-order modeling
  - Actuator modeling
  - Linear model development
  - Monte Carlo simulation and analysis
  - Flight-to-simulation model comparisons





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POC: Matthew Boucher, matthew.j.boucher@nasa.gov

Integrated Adaptive Wing Technology Maturation (IAWTM)

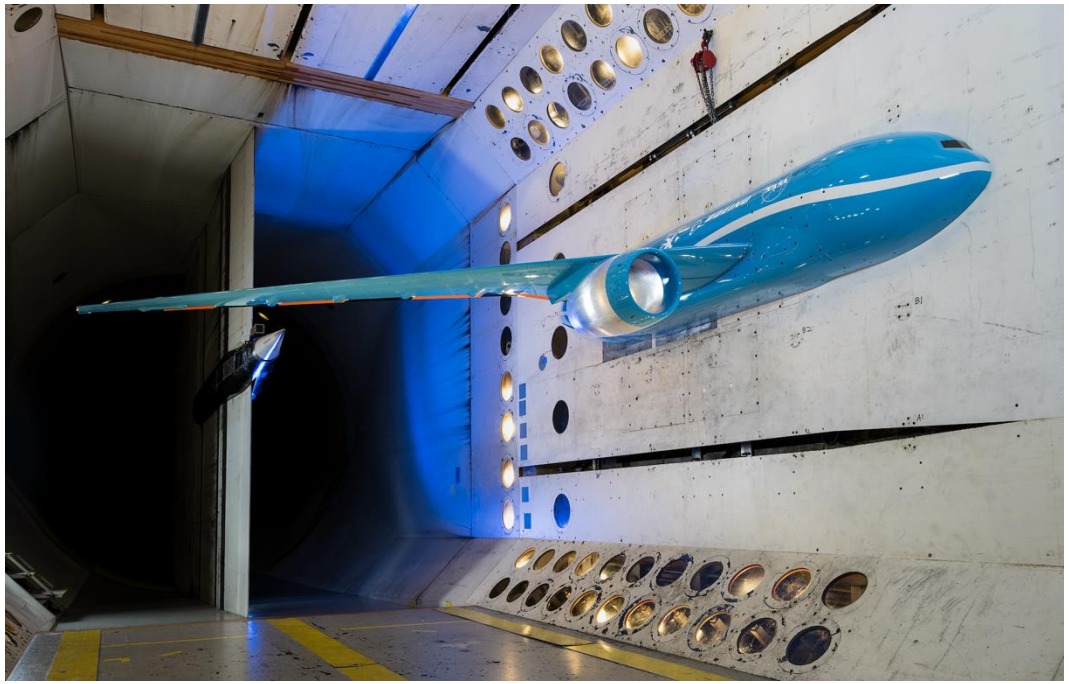
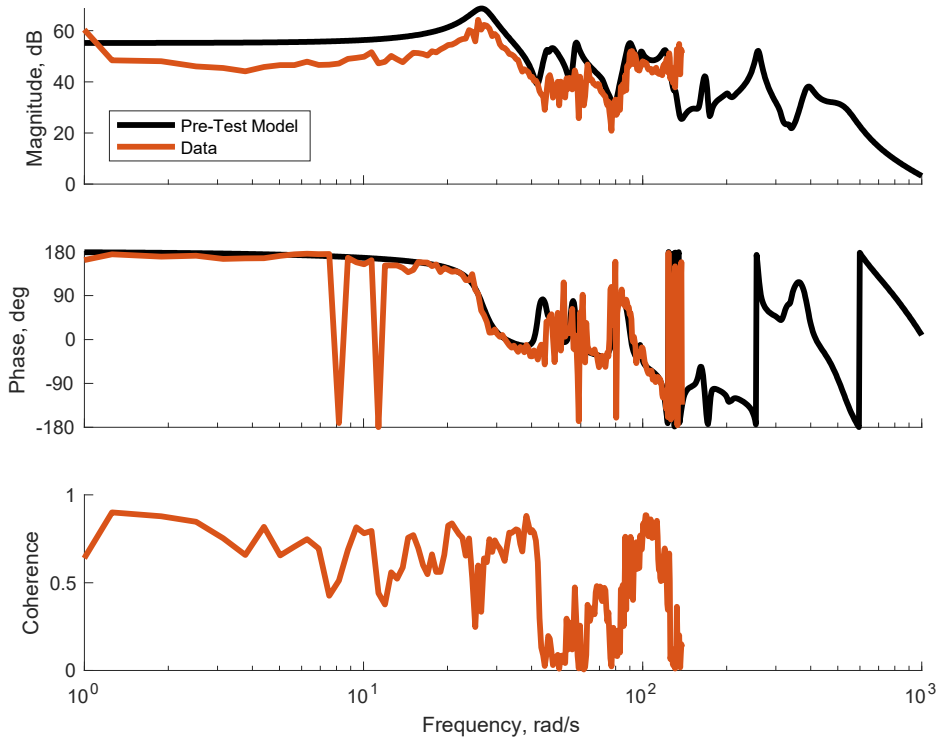


Photo credit: NASA / Mark Knopp

- Develop technologies to improve energy efficiency and lessen environmental impacts of transport aircraft
- Validate control methodologies for real-time drag minimization, maneuver load alleviation (MLA), gust load alleviation (GLA), and active flutter suppression (AFS) architectures
- Entries in the Transonic Dynamics Tunnel (TDT):
  - Entry 1, Jul.—Aug. 2024, for open-loop characterizations
  - Entry 2 (Jun.—Jul. 2025) for closed-loop testing

- Two special sessions at AIAA SciTech Forum 2027
  - Active flutter suppression
  - Maneuver load alleviation
  - Gust load alleviation
  - Real-time drag optimization
  - Efficient static testing
  - Aeroelastic system identification



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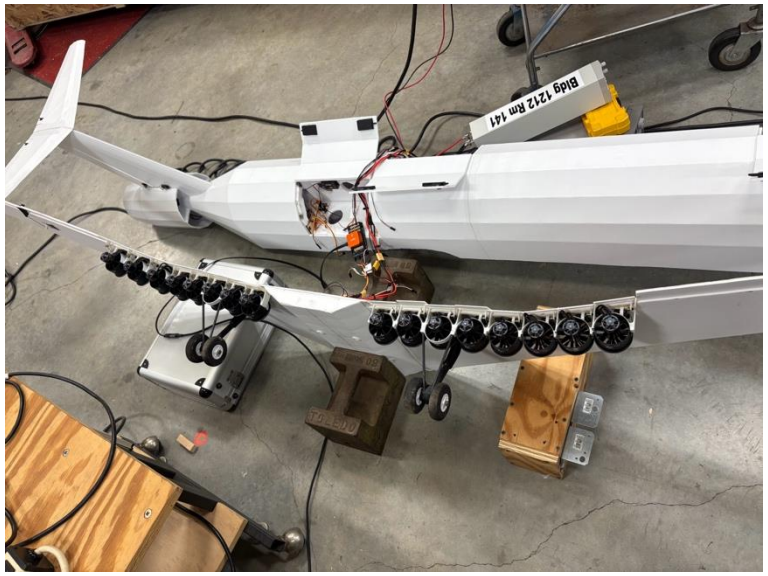
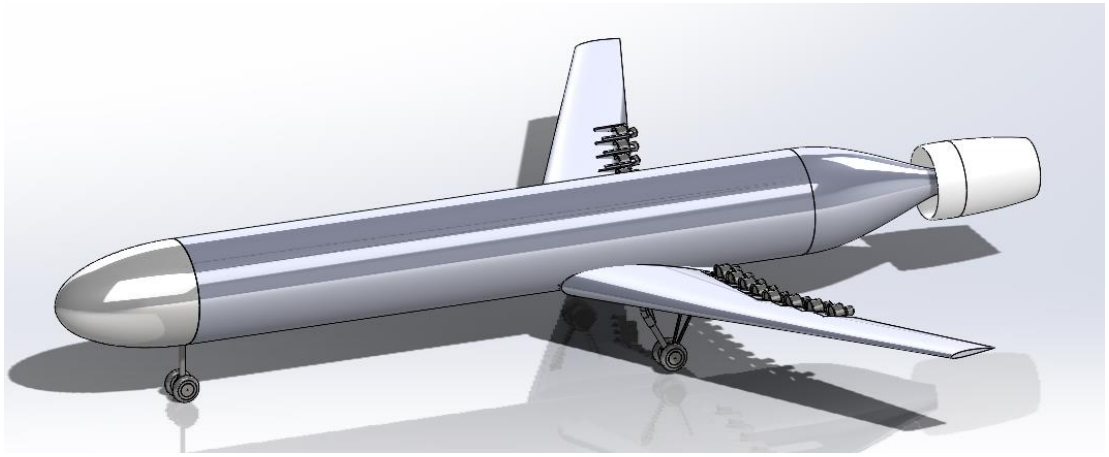
Distributed Electric Propulsion Research Drone (DEPRD)

- Supported by the Transformational Tools and Technologies (TTT) under the Alternative Propulsion Architectures subproject
- Generic transport-inspired vehicle equipped with 8 electric propulsors on each wing and an electrically ducted fan for thrust vectored tail
- Research vision: explore how distributed electric propulsion can supplement removal of traditional control effectors
- Vehicle currently slated for initial flight testing in April 2026
- Other iterations of vehicle in development







POC: Elyse Hill, elyse.d.hill@nasa.gov

RAVEN Flight Testing and Vehicle Development

- Research Aircraft for eVTOL Enabling techNologies (RAVEN)
  - Tiltrotor electric vertical takeoff and landing (eVTOL) platform
  - Open vehicle geometry, data, and methods
  - 24 control effectors (6 proprotor speeds, 6 proprotor collective angles, 4 nacelle tilt angles, 6 flaperons, stabilator, rudder)
  - Aero-propulsive modeling, flight controls, and acoustics research
- Subscale Wind-Tunnel and Flight Test (SWFT) vehicle
  - 38 lb, 5.7 ft wingspan, 19.5 in diameter proprotors, 28.6% scale
  - Ongoing flight-test envelope expansion (100+ flights to date)
  - Active use for dynamics and control research[1]
  - Custom unified flight control algorithm[1]
  - Flight-test system identification using multisine inputs[2]
- 1,000-lb-class vehicle under development
  - Flight physics similar to passenger-carrying eVTOL aircraft
  - Recent substantial increase in priority towards realization
  - Flight control algorithm validated and refined on RAVEN-SWFT

- Recent Publications:
  1. Simmons, B. M., Ackerman, K. A., et al., "Subscale Tiltrotor eVTOL Aircraft Dynamic Modeling and Flight Control Software Development," *VFS Annual Forum*, May 2025
  2. Simmons, B. M., and Ackerman, K. A., "System Identification for a Subscale Tiltrotor eVTOL Aircraft from Hover Flight-Test Data," *AIAA SciTech Forum*, January 2026

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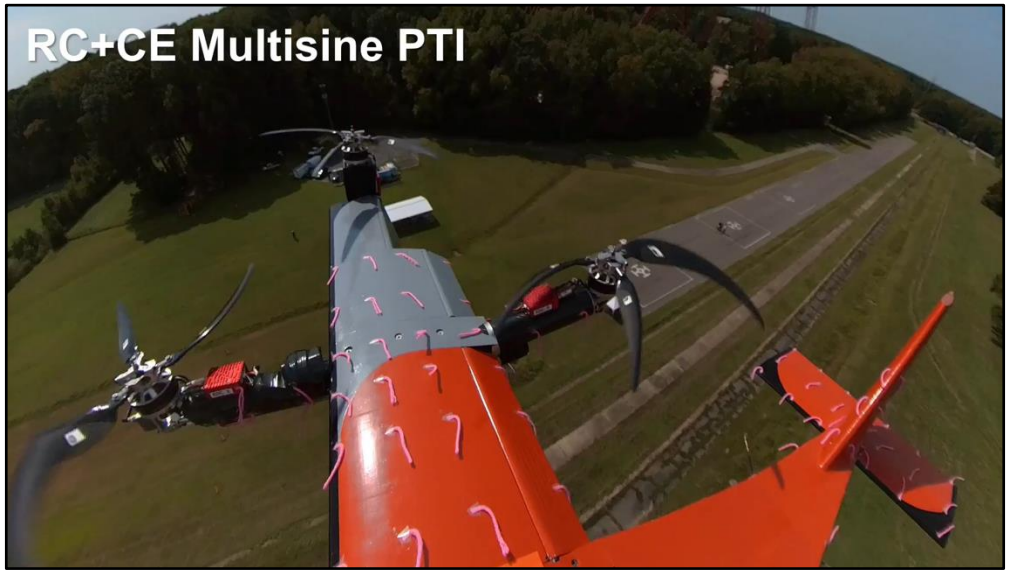

Flight Dynamics Research Facility (FDRF)

- Facility construction complete
- Operational readiness review – 27 Apr. 2026
- Ribbon cutting ceremony – TBD
- Facility calibrations and checkout testing – ongoing
- First customer testing – mid-summer 2026

- Subsonic Flight Demonstrator (SFD) – SUGAR / X-66
  - Static & Dynamic Force & Moment Testing
- DAVINCI - Venus Atmospheric Probe
  - Static Force & Moment Testing
- Entry Systems Modeling (ESM)
  - Forced Oscillation / Aerodynamic Damping Tests
- Dragonfly – Titan rotoecraft & aeroshell
  - Separation Aerodynamics
- Entry Systems Modeling (ESM)
  - Parachute load cell testing
- RAVEN SWFT - Advance Air Mobility
  - 3-DOF free to roll/pitch/yaw



Test Section	20 ft diameter x 24 ft tall
Speed	0 – 172 ft/s (117 mph)
Dynamic Pressure	0 – 35 psf
Reynolds Number	0 – 1.1×10^6
Pressure	Atmospheric
Temperature	Actively Cooled (79°)
Test Gas	Air

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