



NASA Aeronautics – Vision and Outlook

Robert Pearce

Associate Administrator for the Aeronautics Research Mission Directorate (ARMD)

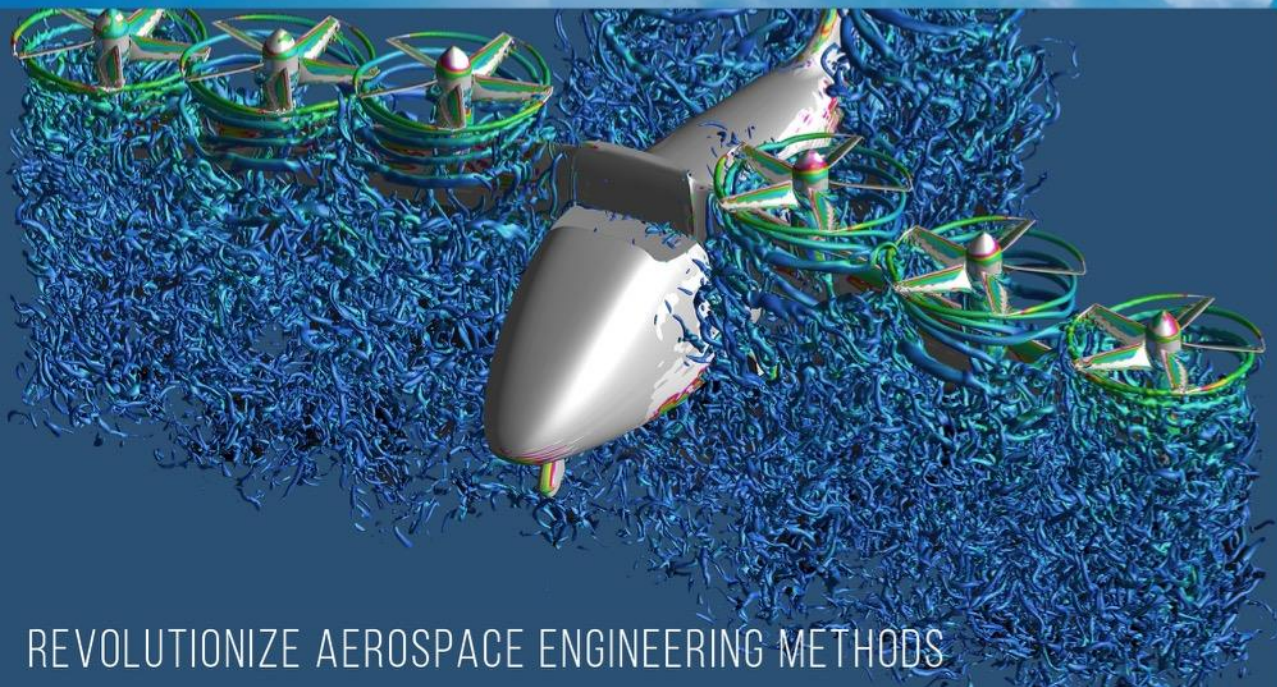
National Aeronautics and Space Administration (NASA)

September 30, 2025



Bottom Right Aircraft Image Credit: University of Illinois / Philip Areall

TRANSFORM AIRFRAMES AND PROPULSION



REVOLUTIONIZE AEROSPACE ENGINEERING METHODS



PIONEER HIGH-SPEED FLIGHT



AUTOMATE AIRSPACE AND SAFETY MANAGEMENT CAPABILITIES

Aeronautics Research Mission Directorate as of FY 2026



FY 2026 Budget Request

\$ Millions	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030
Aeronautics	\$588.7	\$588.7	\$588.7	\$588.7	\$588.7
Airspace Operations and Safety	88.1	96.4	112.4	115.0	117.0
Advanced Air Vehicles	133.4	163.3	161.2	154.9	162.8
Integrated Aviation Systems	167.2	161.3	115.4	110.0	70.0
Transformative Aeronautics Concepts	125.1	82.8	109.8	113.9	134.0
Aerosciences Evaluation and Test Capabilities	74.9	84.9	89.9	94.9	104.9

1/ - FY 2024 reflects amounts in Public Law 118-42, Consolidated Appropriations Act, 2024, adjusted by NASA’s September 2024 Operating Plan, plus \$2.5M for IT Modernization WCF and \$4.5M for the GSA TMF.

2/ - FY 2025 reflects the funding amount specified in Public Law 119-4, Full-Year Continuing Appropriations and Extensions Act, 2025.



TRANSFORM AIRFRAMES AND PROPULSION

Demonstrate Advanced Configurations for Next Generation Aircraft



Research Focus

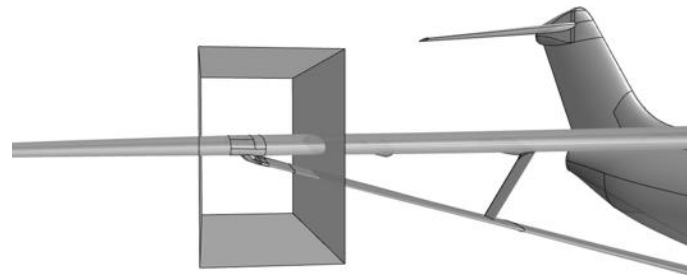
- Develop and test an advanced airframe configuration and related technologies to dramatically reduce aircraft fuel burn to help enable next-generation single-aisle aircraft in the 2030s

Thin Wing Technology

- Conduct ground-based demonstration of thin wing architecture and associated technologies
- Assess icing effects on thin wing design

Truss-Braced Wing Studies

- Conduct ground-based tests of truss-braced wing configurations and explore methods for integrating propulsion technologies with the new design
- Assess progress to inform the X-66 flight demonstrator test campaign

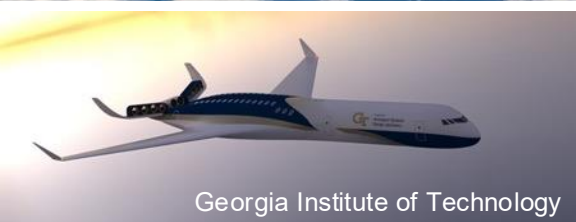


Solving risks associated with thin wing and truss-braced design can yield 5-10% reduction in fuel burn

Pursue Revolutionary Propulsion Options for 2040+



Electra



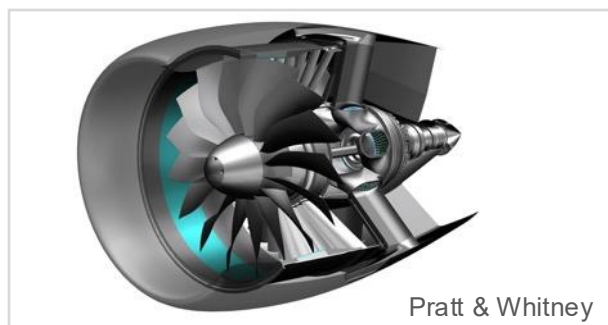
Georgia Institute of Technology



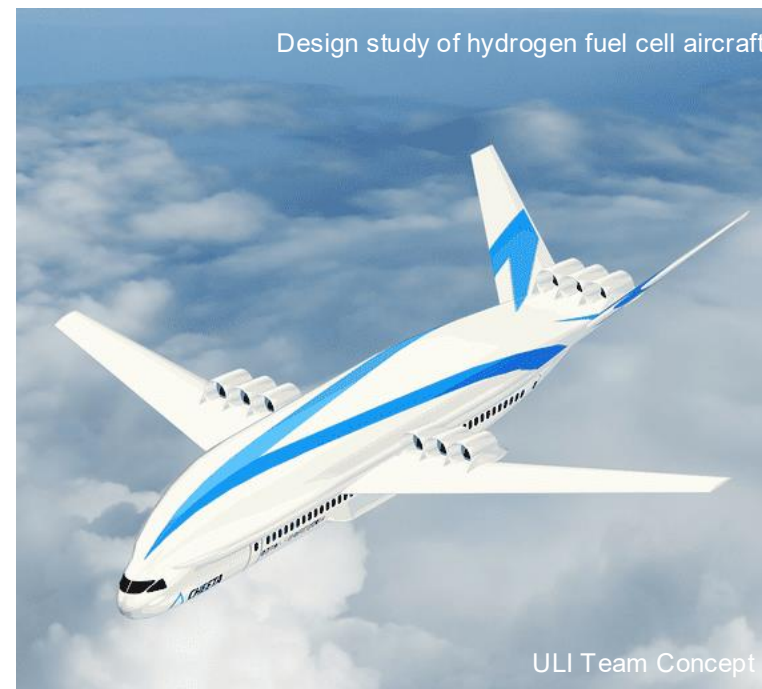
Boeing



JetZero

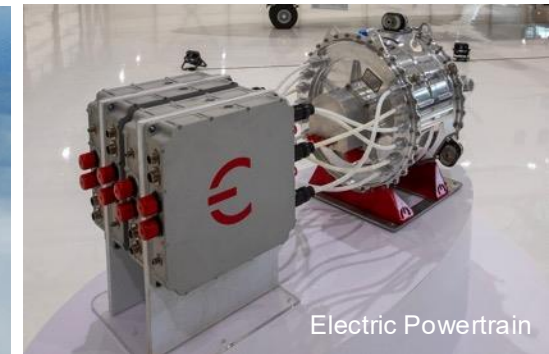


Pratt & Whitney

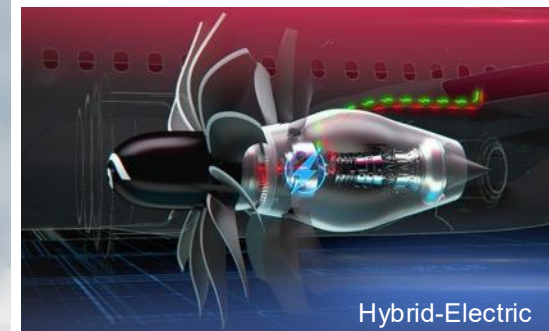


Design study of hydrogen fuel cell aircraft

ULI Team Concept



Electric Powertrain



Hybrid-Electric

Design: Bring Together the Best Ideas

- Studies on advanced concept designs delivered to NASA for potential investment
- Results inform promising technologies and architectures
- Opportunities for new industry partnerships

Energy Innovation: Lower Cost Propulsion Cycles

- Jet fuel is the biggest cost to airlines, and new, potentially lower-cost energy sources are available to supplement or replace it
- NASA tests/evaluates the overlap of technology and energy
- Accelerate research into hybrid-electric, hydrogen fuel cells, cryogenic fuels, methane combustion



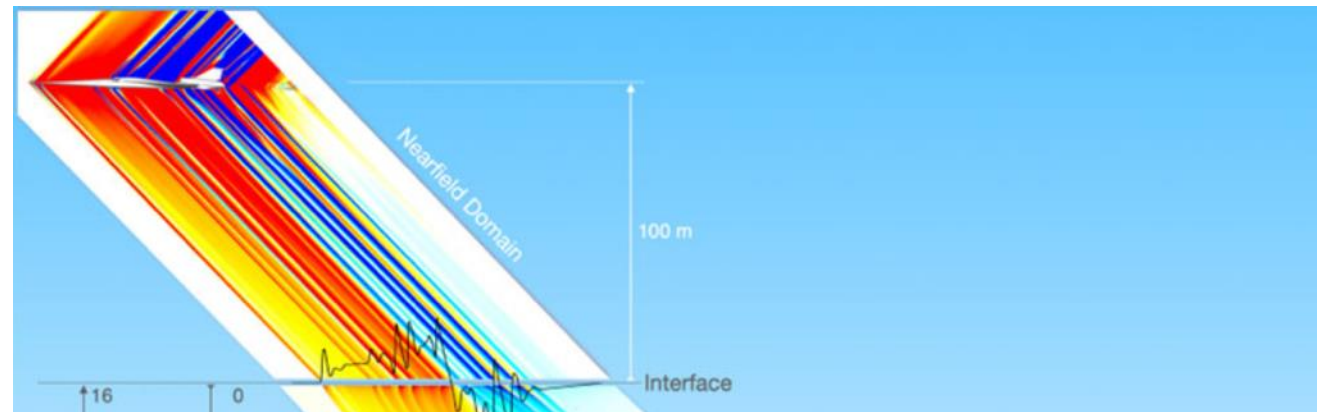
PIONEER HIGH-SPEED FLIGHT

X-59 Quiet Supersonic Flight: Phase 1 to Phase 2 in FY26



Phase 1: Deliver X-59 and Demonstrate Safe to Fly

- Demonstrate X-59 is safe to fly through series of flight tests of increasing complexity



Phase 2: Acoustic Validation

- Validate that X-59 performs to design requirements for quiet supersonic flight
- Prove acoustic and design tools needed by U.S. Industry



Phase 3: Community Response Tests

- Collect data through community response overflight tests to inform domestic and international regulatory bodies
- Data will bring about internationally accepted rule change and enable U.S. competitiveness in the emerging supersonic market



AUTOMATE AIRSPACE AND SAFETY MANAGEMENT CAPABILITIES

Work with FAA and Industry for Safety, Scalability, Efficiency



Demonstrate Future Concepts that Transform and Modernize the National Air Traffic Management System

- Enable increasingly automated operations such as automated trajectory negotiation and mitigation of safety events
- Introduce third-party services in a federated architecture that enables rapid deployment and scalable growth without over burdening air traffic control
- Contribute technologies to FAA modernization efforts



Demonstrate Efficiency and Scalability through Use of Digital Services

- Establish vision and requirements for an integrated digital information environment for common operating picture and third-party services
- Provide tools for the integration and analysis of data



Demonstrate Integrated System-Wide Safety Assurance

- Establish requirements for data, integration, and ML/AI based data mining technologies for future Aviation Safety Information Analysis and Sharing (ASAIAS 3.0)
- Explore advanced trajectory management services and advanced flight deck capabilities to enable safe, efficient operations

Future airspace and safety transformation will be enabled through novel airspace concepts, digitization of data, and system-wide safety assurance.

Build Systems to Safely Maximize Potential of New Vehicles



Tech Transfer to Support Wildland Firefighting

- Transfer techniques using Unmanned Aerial Systems to monitor wildland fires to FAA, industry, and wildland fire management federal and state agencies
- Enable ongoing development of a portable airspace management system for enhanced coordination of wildland fire aerial response



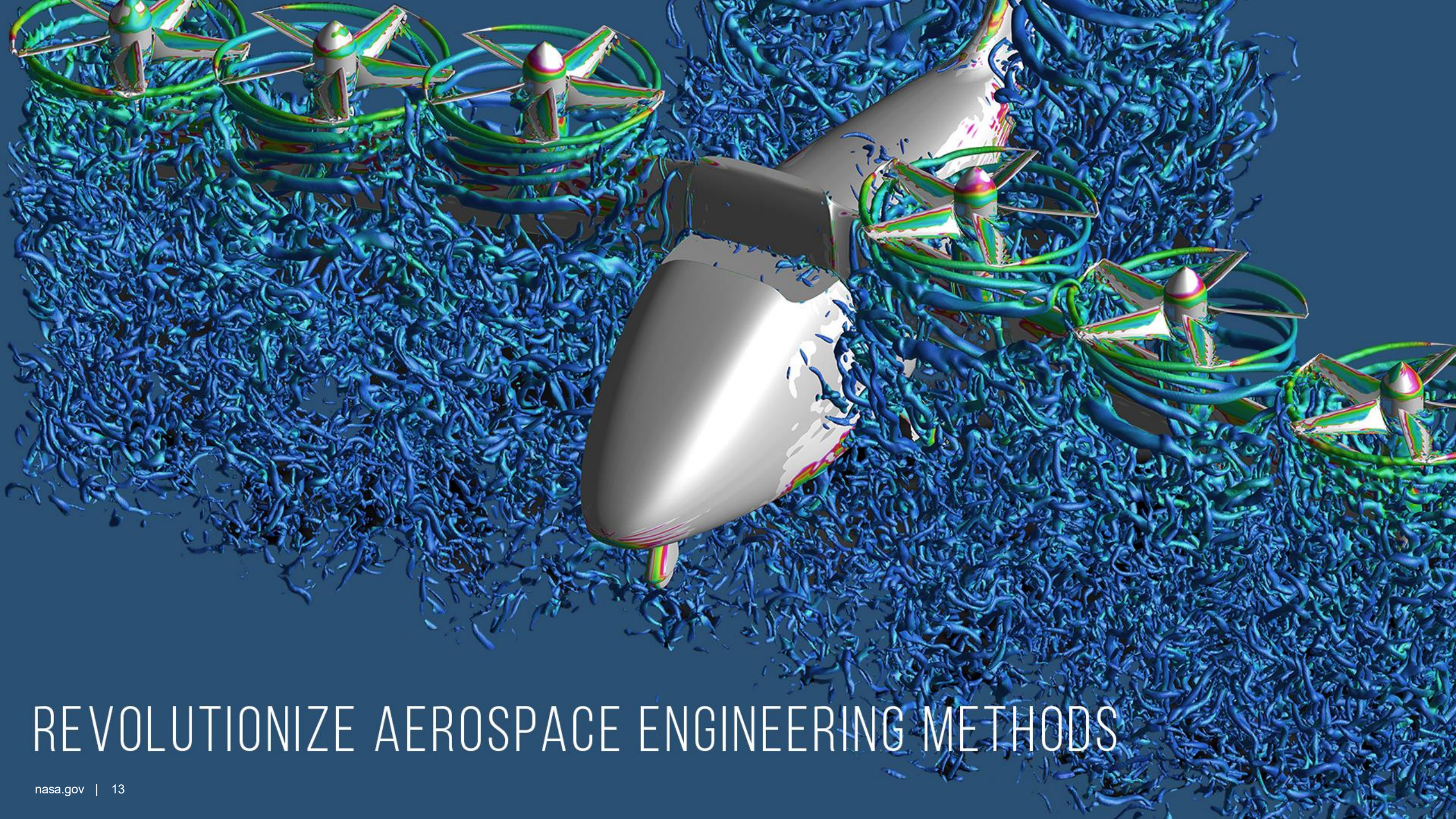
UTM Beyond-Visual-Line-of-Sight

- Demonstrate safe operation of multiple delivery drones in a shared airspace using NASA-developed uncrewed aircraft traffic management system
- Deliver data to FAA and industry to support widespread commercial adoption



Advanced Air Mobility

- Evaluate NASA-developed tools and technologies for strategic deconfliction and scalable AAM operations
- Develop federated airspace management technologies for industry operators of AAM
- Deliver data to inform FAA processes and procedures for safe and scalable integration of AAM vehicles



REVOLUTIONIZE AEROSPACE ENGINEERING METHODS

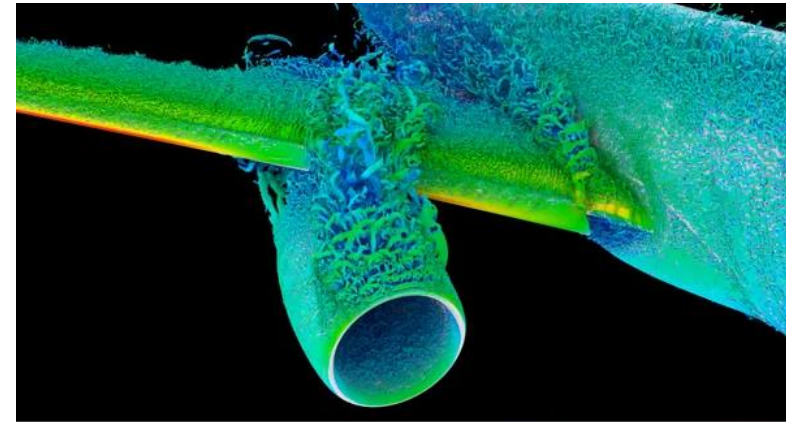
NASA is Uniquely Positioned to Advance State of the Art



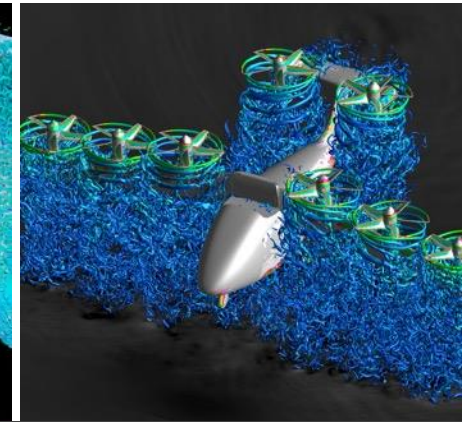
GRX-810 Superalloy for Aviation and Space



Shape Memory Alloys as Smart Vortex Generators



High Fidelity, High Resolution Computational Fluid Dynamics



MATERIALS & STRUCTURES

Materials & Structures

- Use of computational materials & structures and additive manufacturing to innovate new materials (e.g. GRX-810)
- Entirely new material properties that create new functionality (e.g. Shape Memory Alloys)

AEROSCIENCES MODELING

Aerosciences

- Accelerated ability to perform rapid, high fidelity computational design and analysis of complex aerospace systems to analyze, understand and predict performance.
- Validate computational tools to predict complex turbulent airflow around vehicles and within propulsion systems. (e.g. juncture flow experimentation and analysis)



AEROSCIENCES EVALUATION AND TEST CAPABILITIES

Large-Scale Ground Test Capabilities for the Nation



Aerosciences Validation

- Combine simulation tools with ground test capabilities to advance the state of the art
- Accelerate operational data portal to make unique experimental databases more accessible to assist in revealing complex physics and drive next generations of computational methods

Ground Tests

- Support vital test campaigns for NASA Missions, Department of Defense, and commercial partners for aeronautic and space missions
- Digitally transform wind tunnel operations and management, using real-time performance and value metrics to enhance decision-making and align with Federal Data Strategy

Management Model

- Focus resources on supporting seven priority large wind tunnels (up to five wind tunnels will be put on standby)
- Execute new operational model featuring a more flexible, re-deployable workforce aligned with test demand, and the capability to reactivate facilities from standby mode when needed
- Begin operations at new Flight Dynamics Research Facility to replace 83-year-old Vertical Spin Tunnel

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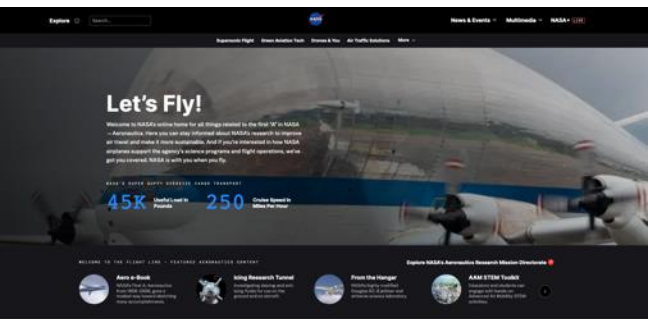
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- Advanced Air Mobility
- Quiet Supersonic Flight Over Land
- A Transformed Airspace
- Sustainable Aviation

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