

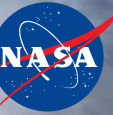
NASA Langley Aeronautics Portfolio Overview

Steven Velotas
Aeronautics Research Directorate
NASA Langley Research Center
September 14, 2026



Our Legacy 109 Years

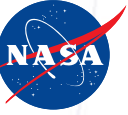
National Aeronautics and
Space Administration



NASA Langley Research Center

Our Missions

National Aeronautics and
Space Administration



AERONAUTICS



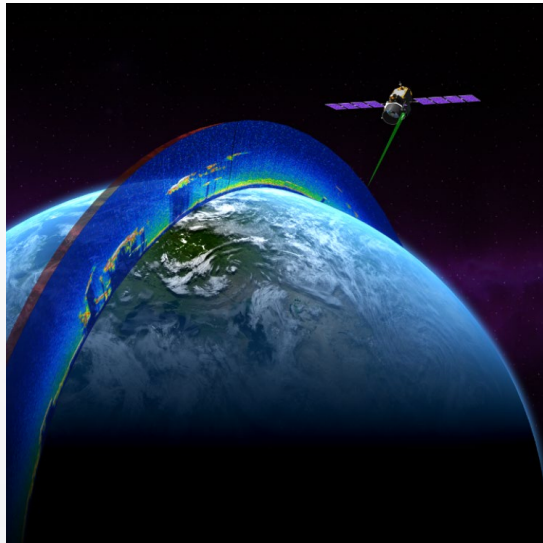
Make air transport
cleaner, faster, safer

EXPLORATION



Create building blocks
for deep space missions

SCIENCE



Science here and
on other worlds

INSPIRATION



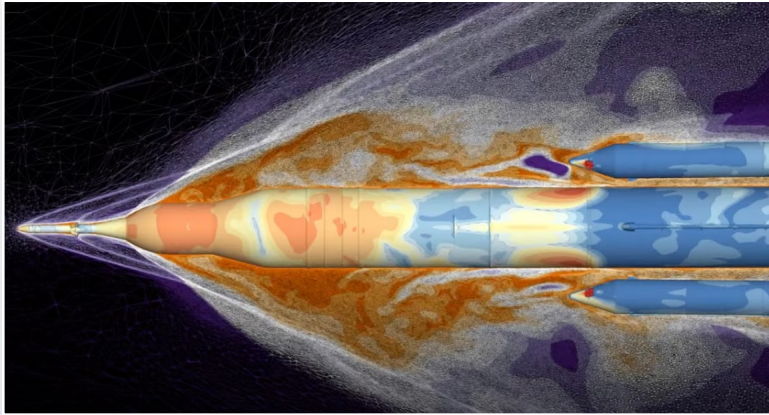
Expand ideas
of what's possible

Core Competencies

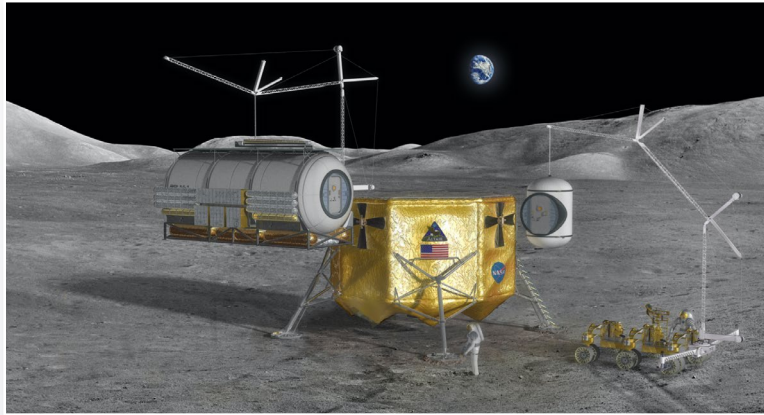
National Aeronautics and
Space Administration



Aerosciences



Structures & Materials



Intelligent Flight Systems



Systems Analysis & Concepts



Entry, Descent & Landing (EDL)



Atmospheric Characterization



Langley – Aeronautics Center of Excellence

National Aeronautics and
Space Administration



NASA Aeronautics Transformations



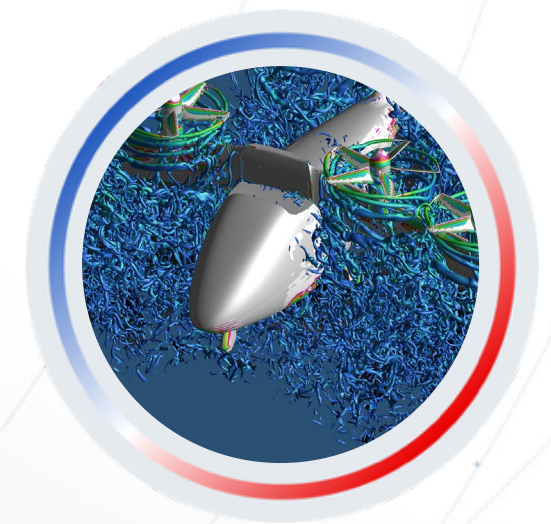
Pioneer High-Speed Flight



**Automate Airspace
and Safety
Management
Capabilities**



**Transform
Airframes and
Propulsion**



**Revolutionize
Engineering
Methods**

Langley - Aeronautics Leadership

National Aeronautics and
Space Administration



AERONAUTICS RESEARCH MISSION DIRECTORATE

Langley has project managers in 9 of 10 ARMD projects and is the only Center to have technical activities in all 10 projects.

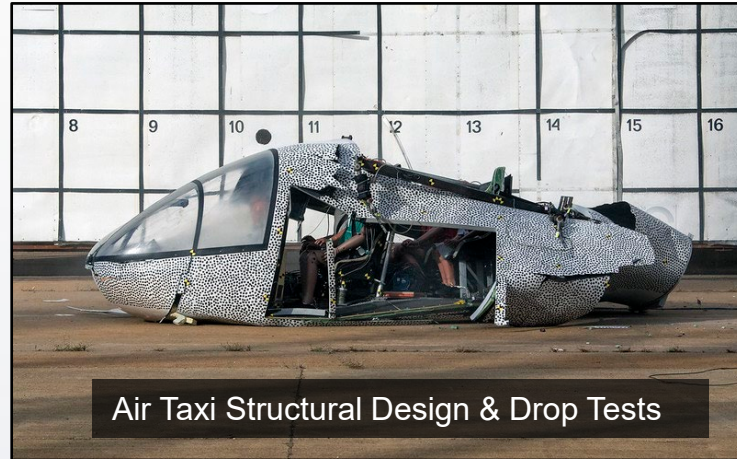


Langley – Advanced Air Vehicles

National Aeronautics and
Space Administration



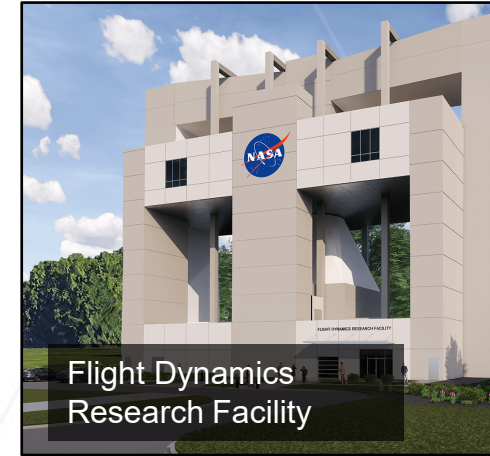
Thin Wing Tunnel Tests



Air Taxi Structural Design & Drop Tests



TTBW Aerodynamics Tests



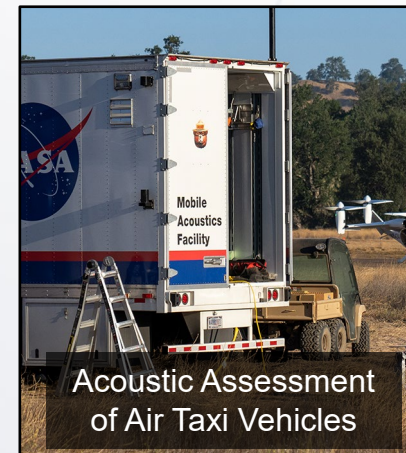
Flight Dynamics
Research Facility



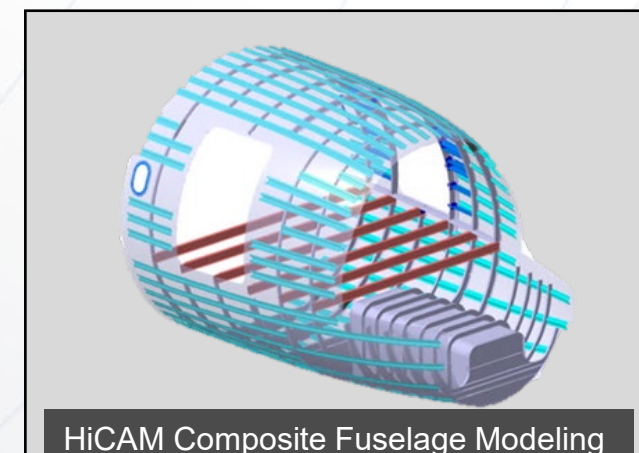
ISAAC Composite
Stitching



Rotor-Tilt Wing Wind Tunnel Tests



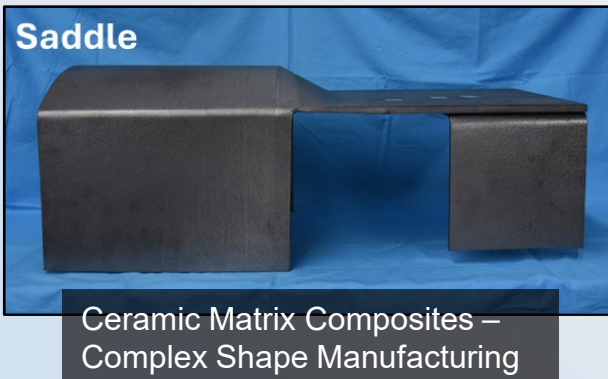
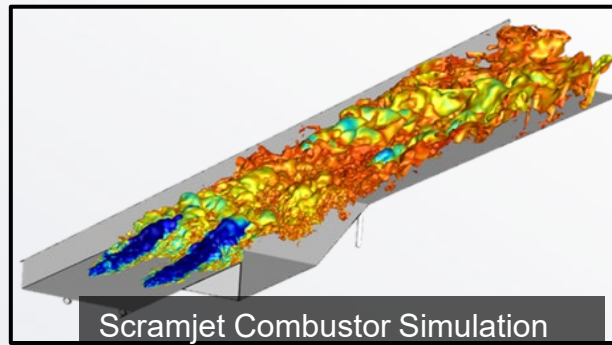
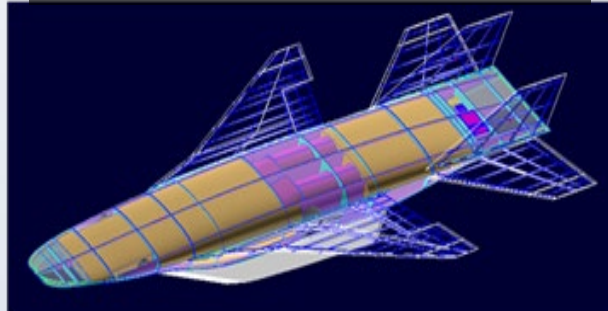
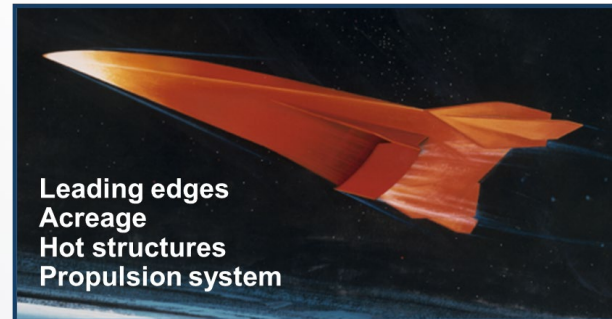
Acoustic Assessment
of Air Taxi Vehicles



HiCAM Composite Fuselage Modeling

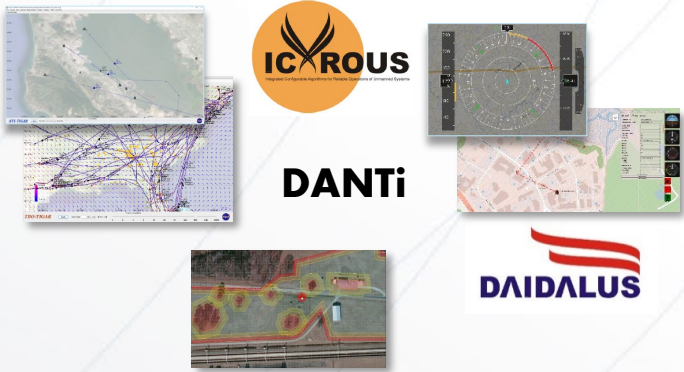
Langley – NASA's Hypersonic Center of Excellence

National Aeronautics and
Space Administration



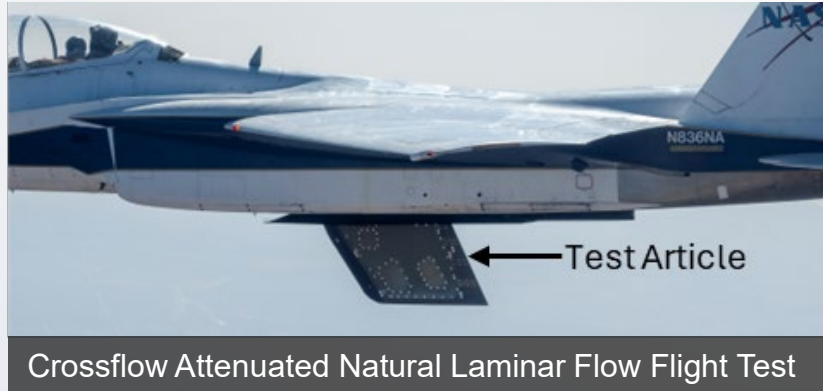
8' High Temperature Tunnel
during X-51 test

Langley – Airspace Operations & Safety



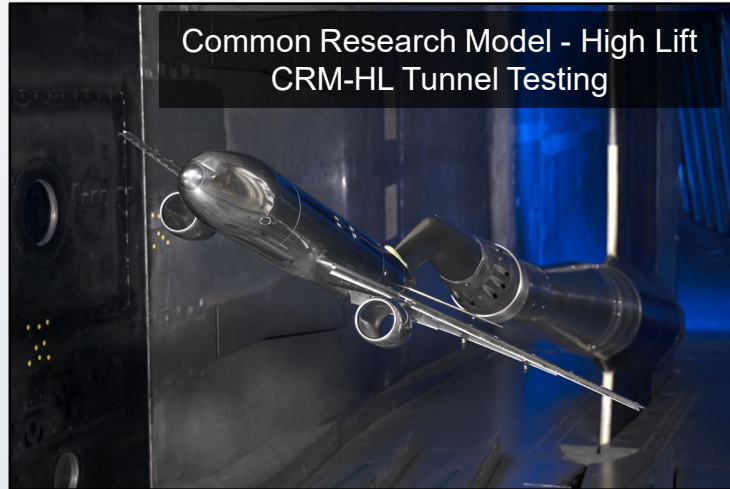
Verification and Validation: Safety Assurance for Aerospace Applications

Langley – Integrated Aviation Systems

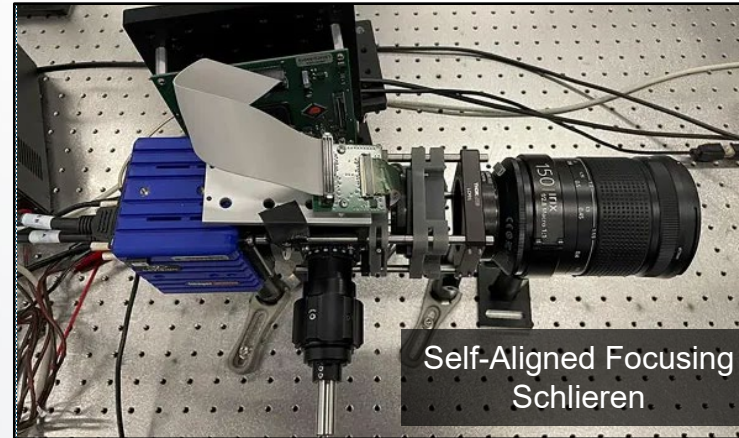


Langley - Transformative Aeronautics Concepts

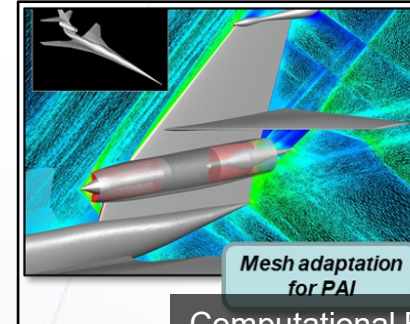
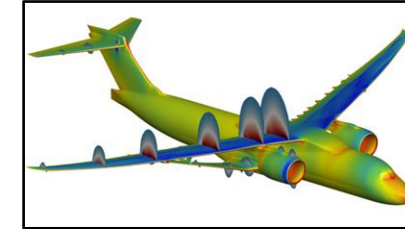
National Aeronautics and
Space Administration



Common Research Model - High Lift
CRM-HL Tunnel Testing

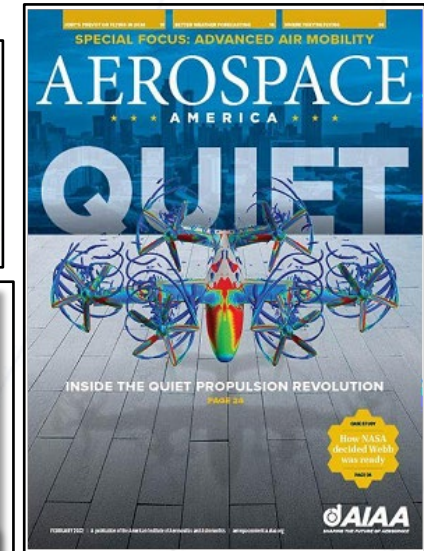


Self-Aligned Focusing
Schlieren



Mesh adaptation
for PAI

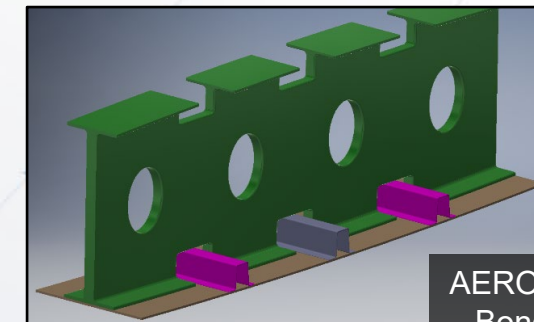
Computational Fluid Dynamic Tools
for Vehicle Design and Assessment
FUN3D & OVERFLOW



Drone Technologies for Organ
Transport Delivery



Swept-wing Transition Experiment
on the Effect of Roughness (STEER)



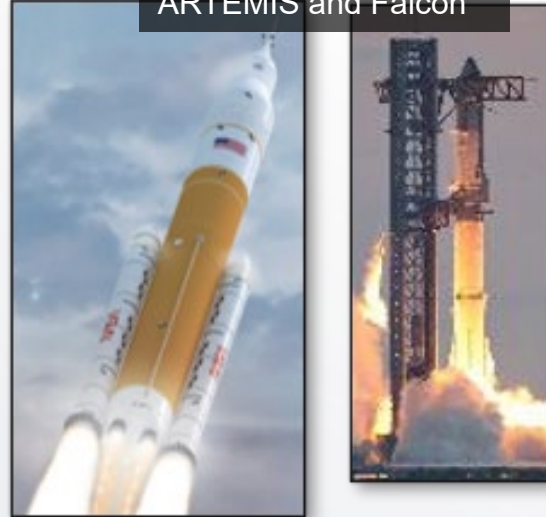
AEROBOND Innovative
Bonding Technology

Langley – Aeronautics for Exploration

National Aeronautics and
Space Administration



CFD Simulations for
ARTEMIS and Falcon



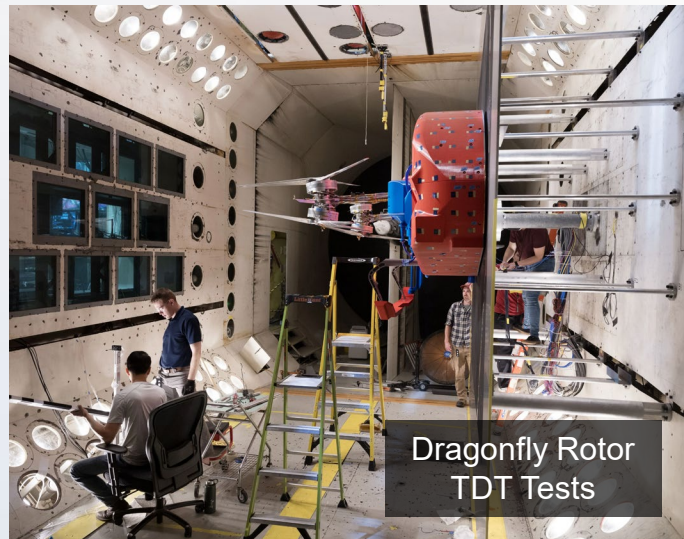
ARTEMIS Launch Abort
System Flight Dynamics
and Trajectories



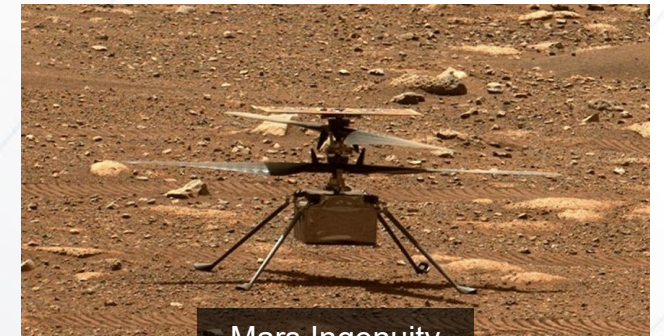
SLS Tunnel Tests in Transonic
Dynamics Tunnel (TDT)



Dragonfly Rotor
TDT Tests



Mars Ingenuity
Aerodynamics



Langley – Wind Tunnels

National Aeronautics and
Space Administration



Langley is responsible for most of the Agency wind tunnel capabilities and is the only Center with tunnels across all flight regimes.

Specialty Tunnels



GLENN

Icing Research Tunnel
Aircraft Icing Condition Simulation



GLENN

Propulsion Simulation Laboratory
Engine and Icing Simulation



LANGLEY

Flight Dynamics Research Facility
Spin and Forced Oscillation
-Under Construction-

Subsonic



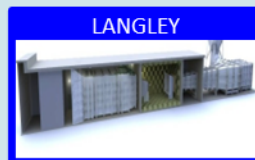
GLENN

9x15-Ft Low-Speed Wind Tunnel
Propulsion systems
performance & acoustics



LANGLEY

14x22-Ft Subsonic Tunnel
Takeoff, Landing, Ground Wind
Loads & Aeroacoustics



LANGLEY

Low-Speed Aeroacoustic Wind Tunnel
Simulation of Jet Exhaust

Transonic



AMES

Unitary Plan Wind Tunnels
11-Ft Transonic &
9x7-Ft Supersonic Tunnels



LANGLEY

**Transonic Dynamics
Tunnel*****
Aeroelasticity & Flutter



LANGLEY

**0.3-m Transonic
Cryogenic Tunnel**
High Reynolds Number Flows



GLENN

**8x6-Ft Supersonic
Wind Tunnel**
Propulsion systems performance



LANGLEY

**National Transonic
Facility****
High Reynolds Number



GLENN

10x10-Ft Supersonic Wind Tunnel
Large-scale Supersonics &
Propulsion



LANGLEY

**4-Ft Supersonic
Wind Tunnel**
Supersonic Vehicles



LANGLEY

20-In Supersonic Wind Tunnel
Supersonic Flows

Hypersonic



LANGLEY

**8-Ft High
Temperature Tunnel****
Large-scale Hypersonics
& Propulsion



LANGLEY

**Aerothermodynamic
Laboratory Complex***
Hypersonic Aerothermal



LANGLEY

SCRAMJET Complex
Hypersonic Propulsion

* NASA Unique, ** Nationally Unique, *** World Unique

LANGLEY WIND TUNNELS

Langley – Ground Test Capabilities

National Aeronautics and
Space Administration



Landing & Impact Research (LAND IR) Facility



Structural Dynamics Research Facility (SDRF)



Integrated Structural Assembly of Advanced Composites



Vibration Tables



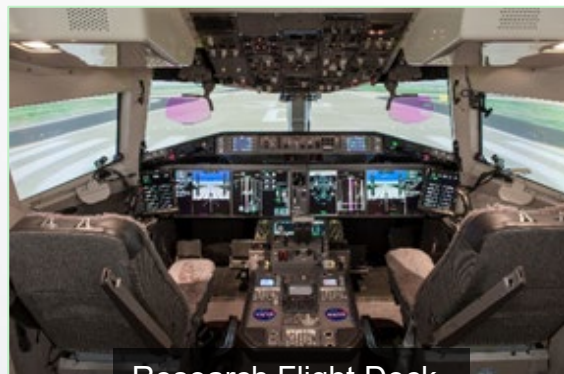
Clean Rooms

Langley – Flight and Air Traffic Simulators

National Aeronautics and
Space Administration



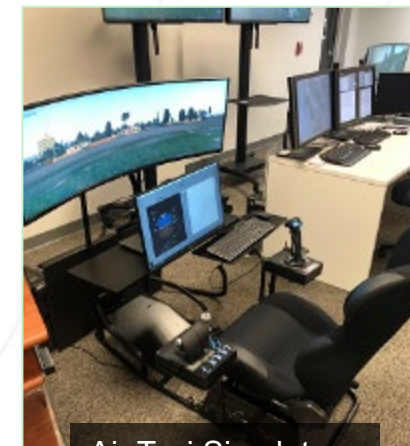
Cockpit Motion Facility



Research Flight Deck



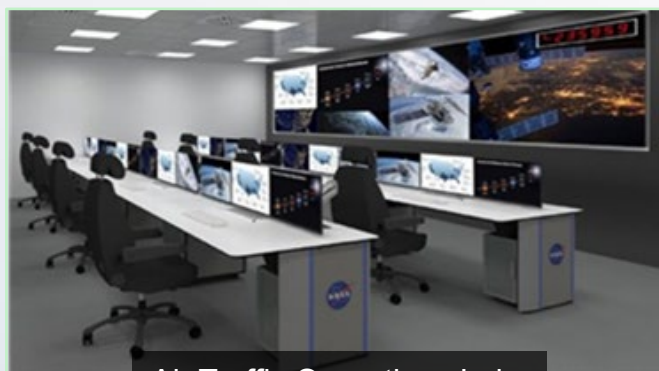
Air Traffic Simulation



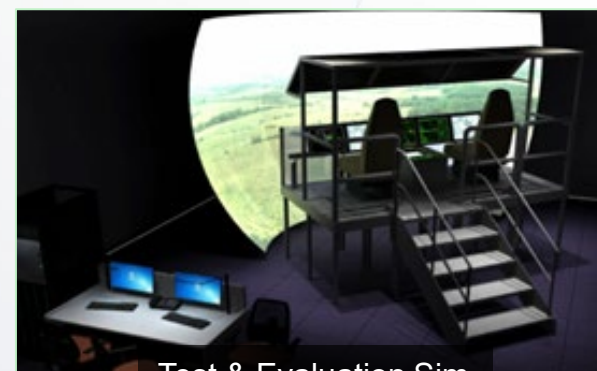
Air Taxi Simulator



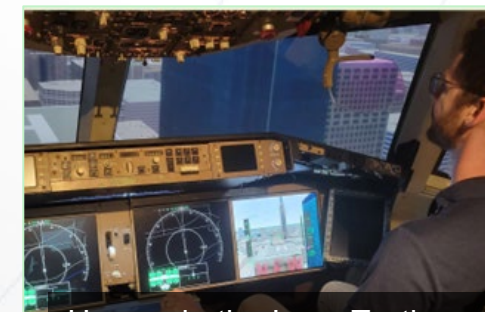
Integration Flight Deck



Air Traffic Operations Lab



Test & Evaluation Sim



Human-in-the-Loop Testing

Langley – Flight Vehicles

National Aeronautics and
Space Administration



Langley – UAS Range Capabilities

Airspace

- 800 Acres of **Urban** and **Rural** Airspace
- FAA COA and LAFB Letter of Procedure for BVLOS
- 400' altitude, no weight limit, 2k' weather profile
- Class D airspace

Technology

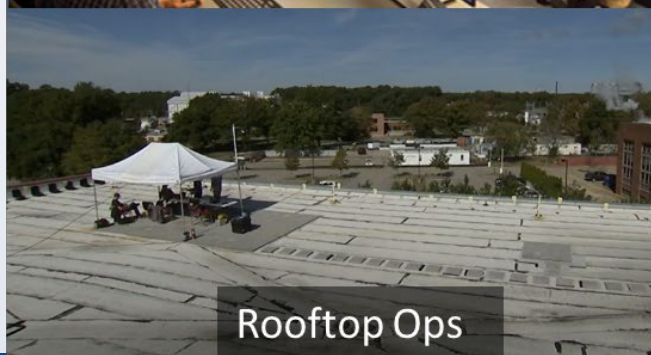
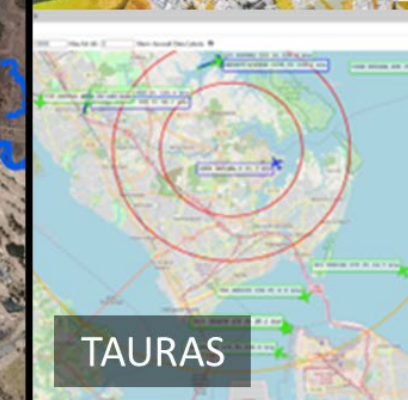
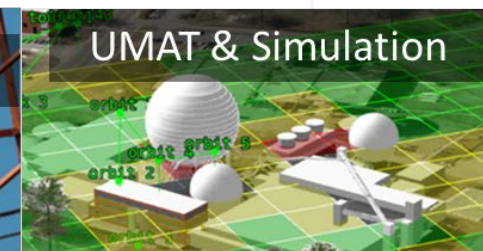
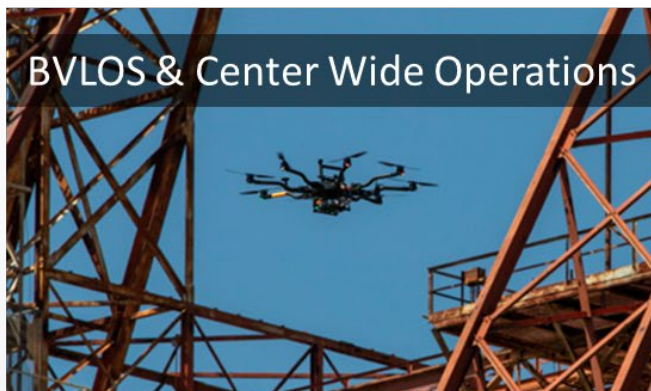
- NextNav Local Positioning System
- ClearCom voice communication system
- Radar, Remote ID, and RF detection systems installed
- GPS Predictive Quality Services
- UAS Mission Assessment Tool (UMAT)
- Traffic Awareness and Ubiquitous Realtime Airspace Surveillance (TAURAS)
- Ground Cameras
- Vision based tracker (version 1)

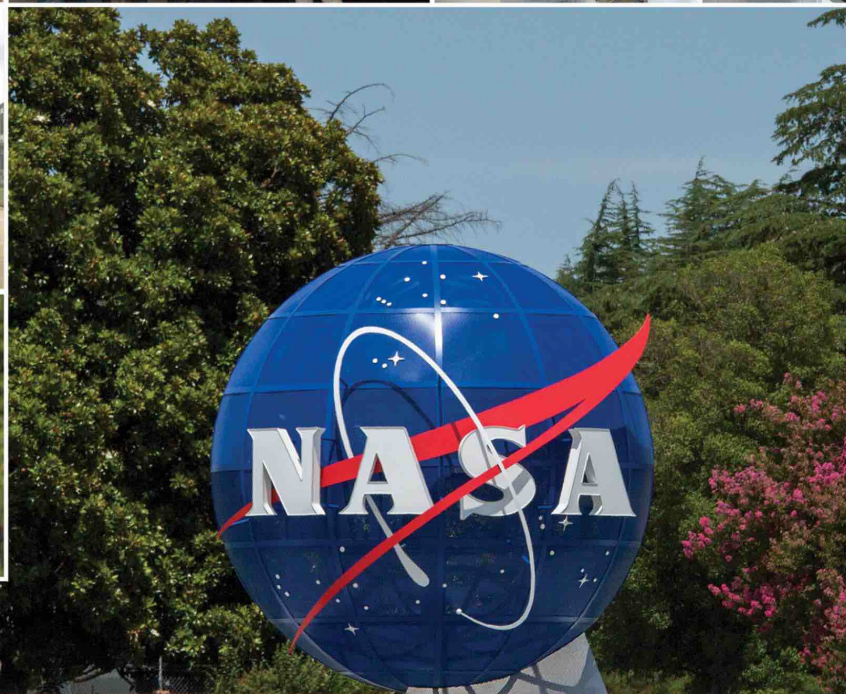
Data Collection

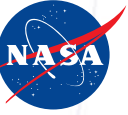
- Telemetry
- Local Weather Stations
- Data networking

Infrastructure

- Spectrum Management Office
- Rooftop Access and Operations
- Indoor flight/testing capability
- Vertiports and fixed wing operations
- Command and Control Rooms
- Safety Process and Procedures
- Simulation capabilities
- Mobile Operations Trailer







Questions?

Langley's Capabilities



Flight Operations

- Adaptable Flight/Autonomy Modeling & Simulation
- Airworthiness
- Diverse Environment Test Range
- Fixed Wing and UAS Flight Operations
- Flight Test/Envelope Expansion
- Sim-to-Flight/TRL Maturation
- Vehicle Modification

Engineering

- Advanced Manufacturing and Testing
- Composite Structures and Models Development
- Electromagnetic Interference and Compatibility
- Electronic Systems Development and Integration
- Environmental Testing
- Flight Software Development, Test, Validation, and Integration
- Flight Vehicle Systems Demonstrations
- Mechanical Engineering Design and Analysis
- Metal Fabrication and Additive Manufacturing
- Power & Control System Design and Development
- Remote Sensing Systems Development
- Structural Design, Development, Testing and Analysis (loads, fatigue, impact, vibration, etc.)
- System Engineering and Integration
- UAS Concepts, Technology Development, and Test

Langley's Capabilities



Aerosciences

- Acoustic Design, Analysis, and Control Technologies; Field Testing
- Active Flow Control and Flow Diagnostics
- Advanced Measurements and Flow Physics
- Aeroelasticity Simulation and Testing
- Aerothermodynamic Simulation and Testing
- High Fidelity Aerodynamic Modeling, Simulation, and Analysis (FUN3D, OVERFLOW, etc.)
- High Performance Computing
- Hypersonic Airbreathing Propulsion Technologies Development and Testing
- Psychoacoustics
- Sonic Boom Modeling, Prediction, Propagation
- Unsteady Aerodynamics
- Vehicle Aerodynamics (Aircraft, Space, UAM)
- Vehicle Performance Subsonic – Hypersonic
- Wind Tunnel and Flight Testing

Intelligent Flight Systems

- Aerospace Vehicle Guidance and Control Design
- Air Traffic Management Integration and Analysis
- AI/ML Technology Development and Assessment
- Autonomous System and Technology Development
- Flight Deck Technologies Development & Testing
- Flight Dynamic Modeling and Stability Analysis
- Formal Methods Development
- Human-Autonomy Teaming
- Human Factors & Human-System Integration
- Operator Station Design & Integration
- Safety Management Systems
- Trajectory Optimization and Conflict Avoidance Sys.
- Uncertainty Quantification
- V&V and Assurance of Aerospace Systems
- Vehicle Autonomy & Multi-vehicle Coop. Operations
- Vision Systems

Langley's Capabilities



Structures and Materials

- Additive Manufacturing
- Advanced Fabrication and Structural Assembly
- Advanced Materials Development
- Characterization of Materials
- Composite Bonding Technology
- Composite Processing Modeling and Technologies
- Computational Modeling and Simulation
- Damage Mechanics - Composites and Metallics
- Digital Twins
- Hot Structures Concepts and Development
- Hypersonics Material Environmental Testing
- Impact Dynamics Testing: Structures & Occupant
- Mechanical Testing
- Nondestructive Evaluation Modeling and Testing
- Stitched Composites
- Structural Mechanics and Dynamics Testing
- Thermal Protection Systems

Systems Analysis

- Advanced Concepts Development
- Aerodynamic Analysis
- Aerothermodynamics Analysis & Tools
- AI/ML Assessment
- Airspace Mission Integration and Operations
- Boom Propagation
- Conceptual Vehicle Analysis/Configuration
- eVTOL Trajectory and Performance Analysis
- Model Based Systems Analysis
- Optimization for Vehicle/Mission Designs
- Risk Analysis
- Structural Analysis
- System Integration
- Uncertainty Quantification
- Vehicle Design and Sizing