

National Aeronautics and Space Administration



NASA Dryden Flight Research Center

Mission Information and Test Systems

SERVICES

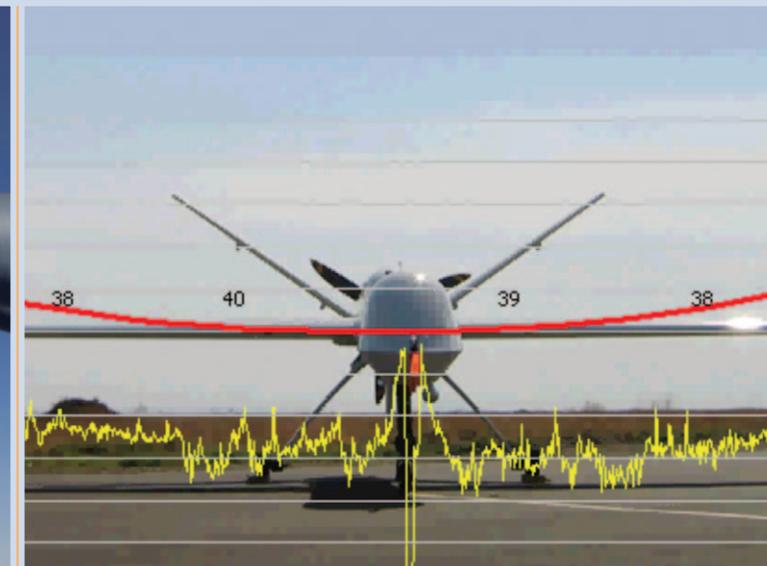
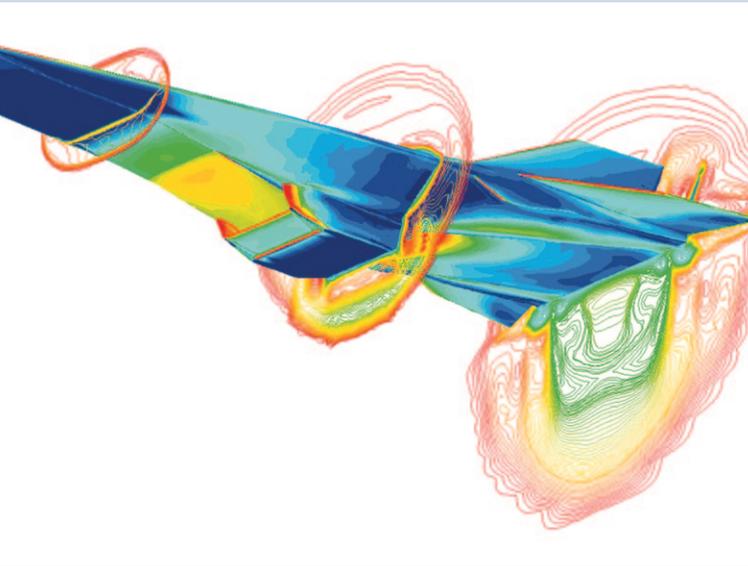
Enabling and Showcasing Discoveries through Flight

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FLY WITH US

The Mission Information and Test Systems Directorate at NASA's Dryden Flight Research Center (DFRC) is where you can find comprehensive flight research and testing services—alongside some of the world's most knowledgeable aerospace engineers. Our specialists address your challenges and help you formulate a safe and successful path to flight. We personally set up our equipment and deliver hands-on training, technical support, comprehensive test data, and detailed analysis.

From Research and Testing to Flight and Beyond



Conceptual Design and Engineering

Dryden pilots, engineers, scientists, and technicians are helping ensure the success of some of the nation's most complex and innovative flight research programs. In the early stages of concept development and experiment formulation, our engineers can share their impressive knowledge to help you overcome technical challenges, troubleshoot problems, and test and validate design concepts. Our state-of-the-art aircraft modeling and design capabilities help ensure the viability of new aeronautical designs.

The Mission Information and Test Systems staff is highly adept at supporting the constantly changing research and development needs and priorities of a wide variety of customers. We support experimental flight test programs for space-based, hypersonic, supersonic, subsonic, manned, and unmanned aircraft and ground-based vehicles.

Dryden's aerospace engineers have extensive technical expertise in aerodynamics; guidance, navigation and control; propulsion; static and dynamic structures; flight hardware and software; and systems engineering and integration. Our clients rely on this expertise to achieve significant breakthroughs in flight design and performance.

Pre-Flight Ground Testing

Our world-class testing capabilities offer reliable and secure facilities, high-quality data, and cost efficiency.

Thermal and mechanical load studies—including ground vibration testing of structural components, instrumentation, and complete flight vehicles—enable customers to calibrate and evaluate flight-load instrumentation under anticipated in-flight conditions.

Our high-fidelity simulations perform real-time vehicle-in-the-loop simulations with the actual flight vehicle. These simulations verify and validate complex designs of aerospace vehicles and their sub-systems prior to flight.

Dryden's unique workstations are linked to mission control rooms and other facilities. Researchers and engineers use simulation results to establish real-time metrics and measurements for immediate clearance of flight test points. The simulation laboratory can also provide control room personnel and/or a flight crew with training opportunities to rehearse a particularly hazardous or complex mission.

Dryden's pre-flight ground testing ensures structural integrity and safety through all phases of testing.

Flight Research and Testing

Flight research and testing represents the very core of our mission at Dryden. We offer a comprehensive set of resources for controlling and monitoring flight activities and real-time acquisition and analysis of research data.

Dryden maintains two mission control centers for real-time ground and flight operations. The control room engineering stations are fully equipped with communications (radio and intercom) panels, video monitors, weather data, and a telemetry/radar acquisition system. This state-of-the-art equipment collects, processes, distributes, and stores data, enabling engineers to successfully monitor and analyze the status and performance of each research vehicle. During flight testing, Dryden provides aerial photography of the aircraft to capture both still and video imagery, with time tags, enabling engineers to correlate all data sources by time.

Dryden's mobile flight testing services are also available for rapid deployment to a specified location on short notice. These systems provide radio-frequency communication; video and telemetry-tracking support; and telemetry tracking for test missions outside local airspace boundaries.

Post-Flight Data Analysis

The Mission Information and Test Systems team collects a wealth of data acquired from multiple sources to help customers analyze test results. Precision radar provides tracking and space positioning information on research vehicles and other targets, including satellites. Fixed and mobile telemetry antennas receive real-time data and video signals from the research vehicle and relay this data to telemetry processing areas. The processed data is displayed at the engineering stations in the mission control centers and archived in a post-flight storage area. Video monitoring provides real-time and recorded data for the control and safety of flight test missions. All of this data is merged into a single, time-correlated stream for real-time display, processing, distribution, and storage. The mobile operations system can process and display data onsite or reformat the data and transmit it to the customer.

The Mission Information and Test Systems team provides layers of redundancy to ensure that clients receive the most comprehensive set of data to assist in post-flight analysis. Our world-class scientists and engineers can be leveraged during reconstruction and/or playback to provide feedback on flight testing.

OUR UNIQUE FACILITIES

Dryden's Mission Information and Test Systems team operates some of the most versatile, affordable, and comprehensive flight research testing facilities in the nation.

Research Aircraft Integration Facility

At Dryden's Research Aircraft Integration Facility (RAIF), clients have the opportunity to conduct custom-designed testing of advanced aircraft through all phases of a research program. This one-of-a-kind facility offers high-fidelity, real-time simulation capabilities for rapid evaluation of design concepts, control law development and validation, flight safety analysis, pilot-, vehicle-, and hardware-in-the-loop operations, combined systems testing, and post-flight data analysis. Each element of a flight vehicle can be regulated and monitored in real time as it interacts with the rest of the aircraft systems. The simulation laboratory is also linked to Dryden's mission control centers. This rare and powerful capability enables you to conduct training for flight crew and control room personnel (including playback to introduce errors).



Capabilities

- High-fidelity, real-time, and batch (desktop) flight simulation
- Eleven dedicated simulation laboratories
- Verification and validation testing (pilot-in-the-loop; hardware-in-the-loop; vehicle-in-the-loop; closed-loop)
- Customized services for unique research aircraft and unmanned aerial vehicles (UAVs)

Flight Loads Laboratory

Dryden's Flight Loads Laboratory (FLL) is a premier aircraft testing facility. The laboratory supports thermal, mechanical, modal survey, and structural mode interaction research and testing services—all under a single roof—providing both convenience and efficiency. The FLL's world-class technical staff provides expertise in test design, test operations, load and stress analysis, dynamic and thermal analysis, instrumentation, and systems development. The facility also offers a unique virtual laboratory system for remote, real-time monitoring of tests through a secure Internet connection.



Capabilities

- Mechanical, thermal, modal survey, and structural mode interaction testing
- Full aircraft or single component testing
- Hydraulic load and thermal control systems
- Conventional and high-temperature instrumentation for ground and flight testing
- Fiber optic sensing technology for real-time distributive strain and temperature sensing

You may know Dryden offers...

- 350+ days of flying weather
- Over 225,000 square feet of hangar space at DFRC, and 210,000 square feet of hangar space and an equivalent amount of space for offices, labs, conference accommodations, and storage at the Dryden Aircraft Operations Facility
- Deep experience in one-of-a-kind flight projects
- Access to Edwards Air Force Base, Plant 42, and vast western ranges
- Full service for unmanned aircraft system customers requiring test range access, technical expertise, and test resources

Western Aeronautical Test Range

The Western Aeronautical Test Range (WATR) provides all of the state-of-the-art equipment you need to conduct safe, secure, and data-rich flight testing. Two mission control centers offer real-time flight monitoring, test point clearance, and situational awareness training. WATR supports flight research and testing through radar, telemetry, audio, video, and flight termination systems. Two high-accuracy C-band instrumentation radars provide time, space, and position information of research aircraft and low earth orbiting spacecraft to the mission control centers, tracking targets out to 3,000 nautical miles. A Differential Global Positioning Satellite (DGPS) ground station generates error corrections that can be up-linked to a research vehicle for precision DGPS time-space-position information. The corrected downlink GPS from the aircraft and ground station provides additional highly accurate positioning information to ground controllers and engineers. Video monitoring gives engineers on the ground the best view of the flight vehicle being tested. WATR mobile systems can also be rapidly deployed to a specified location on short notice.



Capabilities

- Two mission control centers
- Precision radar
- Fixed and mobile telemetry tracking systems
- Video monitoring (day and night, including infrared coverage)
- Audio communication networks
- Rapidly deployable mobile systems

Consolidated Information Technology Center

Dryden's new 22,000-square-foot Consolidated Information Technology Center is a state-of-the-art facility that consolidates all information technology (IT) services to enable reliable, secure, and rapid analysis of critical flight research data. The facility sets a new standard in providing reliable IT service delivery to Dryden customers. Designed as a Tier 3 data center, it has redundant power and cooling for all systems, so IT services can be delivered seamlessly.



Capabilities

- Data processing, distribution, display, and storage
- Flight research data analysis
- Safe, secure, reliable IT service delivery

But did you know Dryden also offers...?

- Access to restricted airspace, including one of the largest overland supersonic flight test corridors in the U.S.
- Paved surface and hard-clay lakebed runways (68 miles combined length)
- Enhanced flight termination systems
- Simulation laboratories tied to mission control rooms
- Mobile assets and capabilities
- Experimental labs/shops for modifications, repair, instrumentation, testing, and qualification
- Very affordable rates

SUCCESS STORIES

Unmanned Aircraft Systems Integration in the National Airspace System (UAS in the NAS)



Dryden has become a critical national resource for unmanned aerial vehicle research and testing. The UAS in the NAS project is helping enable unmanned aerial vehicles (UAVs) to fly routinely in civil airspace with the same level of safety as manned aircraft. Dryden, in partnership with other NASA centers and key stakeholders, including the Federal Aviation Administration (FAA), is leading the effort to conduct integrated, system-level tests to address safety and operational challenges of national airspace access by UAVs. The project's objective is to reduce technical barriers and ultimately enable all classes of unmanned aircraft systems to routinely perform missions of vital importance to national security and defense, emergency management, and science. The Mission Information and Test Systems team is developing a live, virtual, and constructive simulation and flight test environment that will form the foundation for integrated system-level tests.

Superboom Caustic Analysis and Measurement Project (SCAMP)

Supersonic flight over land is currently prohibited due to loud sonic booms, but a new class of quiet supersonic aircraft is under development. While quiet in cruise flight, the initial acceleration to supersonic flight can still generate loud sonic booms. "When a supersonic aircraft accelerates to its cruise speed, a focusing effect occurs that makes the sonic boom five to ten times louder than a normal cruise sonic boom over a small region," said Ed Haering, principal investigator for SCAMP. The SCAMP team developed an F-18 pilot display that could be used to accurately place loud sonic booms on an array of ground microphones. The Mission Information and Test Systems simulation laboratory was used to test and refine the F-18 display, laying the groundwork for engineers to design quieter supersonic aircraft that will once again be able to travel over land.



DIRECTOR'S MESSAGE

The vision of the Mission Information and Test Systems (Code M) is "to enable and showcase discoveries through flight." From design concept to flight research, data analysis to reporting, we are ready to assist with your research needs. Why build costly and time-consuming flight research infrastructure from scratch when you can leverage NASA's world-class technologies, processes, and expertise? Our capabilities are scalable and can be customized to fit your budget and time frame. Contact us about your research program and see what NASA Dryden can do for you.

The Mission Information and Test Systems team is breaking new ground for UAVs, supersonics, state-of-the-art safety systems, and experimental aircraft.



The ACAT integrated test team won an Aviation Week & Space Technology magazine Laureate Award in March 2011 for successful development and flight test of its automatic ground collision avoidance system.

Automatic Collision Avoidance Technology

Dryden engineers, supported by the Mission Information and Test Systems team, in partnership with the U.S. Air Force, enabled the flight testing and evaluation of a groundbreaking new technology: Automatic Collision Avoidance Technology (ACAT). This lifesaving innovation predicts impending ground collisions for aircraft and, at the last moment, executes avoidance maneuvers. The system automatically prevents controlled flight into terrain, the leading cause of all fighter aircraft mishaps. By flight-testing the system across the entire F-16 flight envelope and in all terrain conditions, including such extremes as flying only 100 feet above ground level in canyons and over mountainous terrain, the ACAT team successfully proved the maturity of this technology and its readiness for transition to operational fighter aircraft.

Boeing Phantom Ray

NASA Dryden was selected by Boeing to direct its flight test operations for the Phantom Ray, a sleek autonomous unmanned aircraft. While at Dryden, the Phantom Ray underwent testing and preparations for its first flights as an advanced technology test bed. Dryden provided research engineering as well as range operations support by the Mission Information and Test Systems team for the project. The Phantom Ray made its first flight at Dryden on April 27, 2011, flying to 7,500 feet at a speed of 178 knots.

The aircraft may participate in future missions on intelligence, surveillance, reconnaissance, suppression of enemy air defenses, electronic attack, strike, and autonomous air refueling.



It's Easy to Work With Us

Our Team Can Help ...

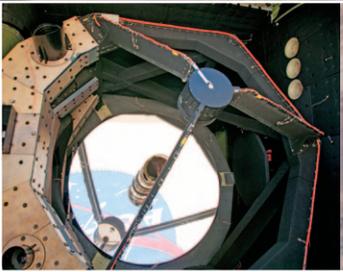
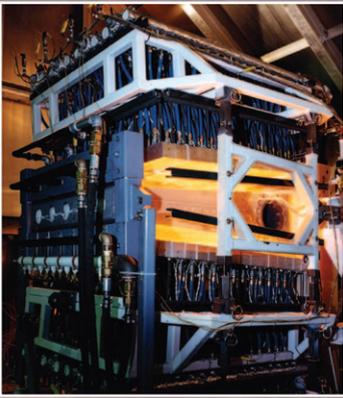
- Introduce you to the Mission Information and Test Systems team
- Arrange tours of test facilities
- Find the skill sets to match your requirements
- Secure your access to NASA equipment, facilities, and capabilities

Contact Us

For more information about how to partner with NASA Dryden's Mission Information and Test Systems team, please contact:

Darryl Burkes, WATR Program Office Manager

NASA Dryden Flight Research Center
P.O. Box 273 • Edwards, CA 93523-0273
Phone: 661.276.2517
E-mail: darryl.a.burkes@nasa.gov
www.nasa.gov/centers/dryden/capabilities/CodeM/index



National Aeronautics and Space Administration
Dryden Flight Research Center
P.O. Box 273
Edwards, CA 93523-0273
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