

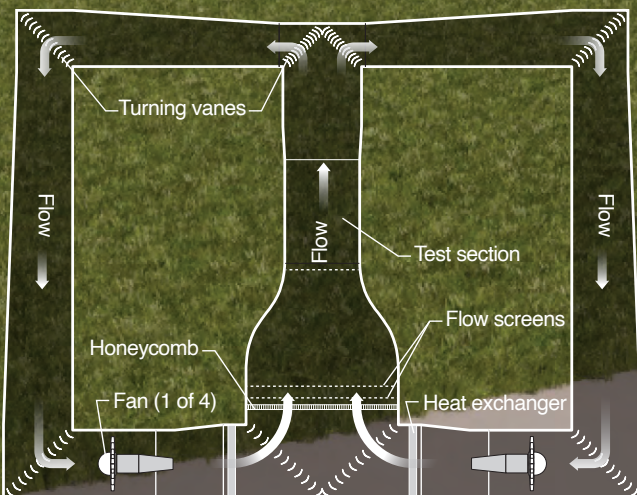
Flight Dynamics Research Facility

The Flight Dynamics Research Facility (FDRF) will soon be NASA's newest wind tunnel. Currently under construction and slated for completion in late 2024, the FDRF will be a highly versatile and cost effective vertical wind tunnel for conducting free flight and captive testing on all manner of atmospheric flight vehicles. This new facility will replace the existing 20 Ft Vertical Spin Tunnel and the 12 Ft Low Speed Tunnel and consolidate their test capabilities into a single new, state-of-the-art wind tunnel with significantly greater performance.

The FDRF will specialize in flight dynamics research on all types of aircraft and spacecraft. Specialty support systems and test techniques enable stall, spin, and dynamic stability characterization of many types of high performance aircraft. The facility will also provide dynamic stability characterization for entry, descent, and landing (EDL) vehicles for human exploration and science missions returning from the moon and Mars, as well as exploration of Titan and Venus. FDRF will play a major role in experimental research for NASA's future autonomous flight vehicle development, Unmanned Aerial Systems (UAS) and X Planes.



Cross Section View



Facility Specs

Test section dimensions	20 ft. diam. by 24 ft. high
Speed	0 – 172 ft/s (0 – 117 mph)
Dynamic pressure	(0 – 35 psf)
Reynolds number	0 – 1.10×10^6 per ft
Pressure	Atmospheric
Temperature	Actively cooled (79° F)
Test gas	Air
Facility Height	131 ft

Free Flight Testing (Dynamically Scaled)

- Free Fall Dynamic Stability
- Vehicle / Parachute Dynamics
- Free Spin Dynamics
- Spin Recovery Techniques
- Parachute Sizing & Riser Length Effects
- Vertical Hover Testing

Captive Testing / Sting Mounted

- Static Force & Moment
- Forced Oscillation / Aerodynamic Damping
- Rotary Motion & Combined Rotary / Oscillation
- Free-to-Pitch, -Roll, -Yaw
- Flow Visualization
- Propellor / Proprotor Thrust Modeling

Aeronautics

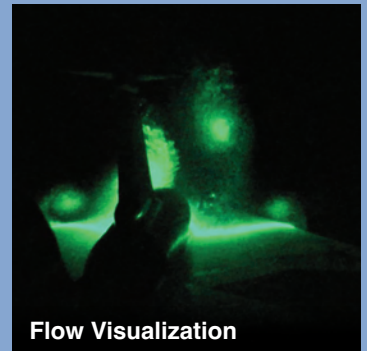
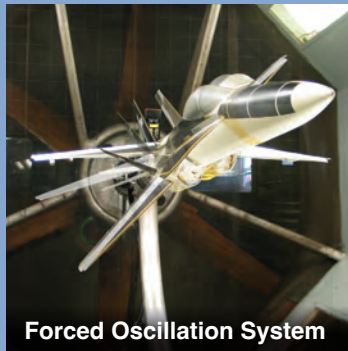
- Rapid aerodynamic modeling for complex Urban Air Mobility designs
- Static & dynamic aero modeling
- High AOA & post stall testing & modeling
- Spin characterization & recovery method development

Human Exploration and Operations

- Vehicle development & risk reduction for crew capsule & launch abort systems. (NASA & Commercial Crew)
- Aerodynamic modeling & validation (static & dynamic)
- Free-flight vehicle dynamics & parachute interactions

Science

- Risk reduction for planetary probe missions and entry vehicle EDL
- Aeromodel development & validation (static & dynamic)
- Free-flight dynamic stability characterization



Data Acquisition

- Dynamic time-correlated acquisition
- 6-DoF Internal Balance Measurements
- Body-Axis Angles and Rates via internal measurements
- Body-Axis Angles and Rates via video motion tracking
- Electronically Scanned Pressures
- Video Capture and Documentation
- Mass Properties Rig (cg location and inertias)

Contact Information

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