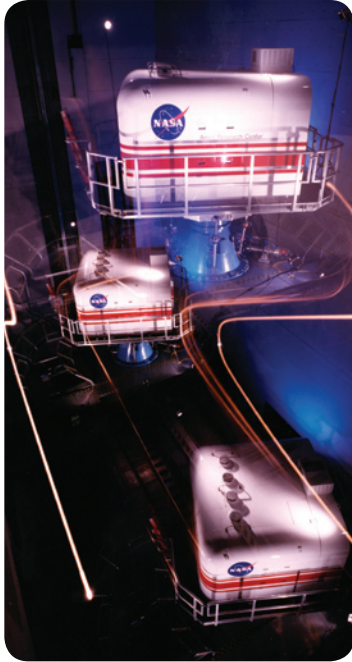


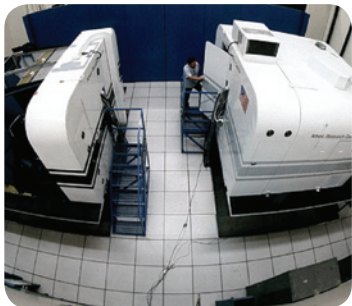


NASA AMES RESEARCH CENTER: THE VERTICAL MOTION SIMULATOR

A Part of NASA's Strategic Capabilities Assets Program



Timelapse image of the Vertical Motion Simulator



Fixed-base lab with two cockpit cabs



Cockpit cab on the simulator beam

The Vertical Motion Simulator (VMS) houses the world's largest high-fidelity motion simulation system, as well as a suite of associated simulation capabilities. This complex provides scientists and engineers with exceptional tools to explore, define, and solve issues in both vehicle design and mission operations, and it aids the research community in generating fast, cost-effective solutions.

The motion system is situated in a 110-foot tower and has a specially designed large-amplitude system that is unique in the world, moving as much as 60 feet vertically and 40 feet horizontally. This is key to high-fidelity simulation, along with other sensory cues, and makes the VMS unsurpassed at simulating aerospace vehicles for the entire flight envelope, including the critical phases of landing and takeoff. Two fixed-base labs are also available for simulations or for preparation of cockpits destined for the motion base.

The facility can be connected to other simulators via a high level architecture, allowing for distributed simulations to occur in real time. This capability enhances the realism of scenarios and allows collaborative teams from across the country to work together in creating the best solutions possible.

FACILITY BENEFITS

- Reduces program risk and provides a safe test environment
- Allows collaborative research teams to iterate design steps in an integrated simulation environment
- Proprietary research procedures in place for protection of data confidentiality
- Remote research capability via virtual laboratory software
- Provides the highest-fidelity motion simulation in a ground-based facility
- Customizable cockpits provide a virtually unlimited range of physical configurations

FACILITY APPLICATIONS

- Develop, test, and refine new and existing vehicle concepts pertaining to handling qualities issues; aerodynamics systems; and guidance, navigation, and control
- Support a diverse array of vehicle types, including fixed-wing, rotary-wing, rail-mounted, and ground
- Perform accident investigations
- Accommodate both NASA and external programs (e.g., industry, DOD, university)



NOMINAL OPERATIONAL MOTION LIMITS*

Axis	Displacement (ft)	Velocity (ft/s)	Acceleration (ft/s ²)
Vertical	+/-30	16	24
Lateral	+/-20	8	16
Longitudinal	+/-4	4	10
Roll	+/-18 (deg)	40 (deg/s)	115 (deg/s ²)
Pitch	+/-18 (deg)	40 (deg/s)	115 (deg/s ²)
Yaw	+/-24 (deg)	46 (deg/s)	115 (deg/s ²)

*Maximum cockpit weight on beam: 15,000 lbs

CUSTOMIZABLE COCKPIT FEATURES

- Multiple EPX 5000 image generation systems; 15 channels
- Collimated and direct-projection displays of out-the-window views
- Head-up displays
- Helmet-mounted displays; head-tracker capability
- Night-vision capability
- Glass cockpits
- Full suite of inceptors (standard and custom)
- Seat shakers
- Large inventory of control loaders

DATA COLLECTION CAPABILITY

- Time-series data; 1,300 variables simultaneously
- Strip chart recorders
- Digital video and audio capture; in-cockpit cameras



CONTACT INFORMATION

<http://www.aviationsystemsdivision.arc.nasa.gov/facilities/vms>

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