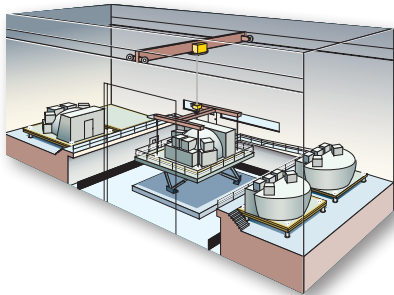




NASA LANGLEY RESEARCH CENTER: THE FLIGHT SIMULATION FACILITIES

A Part of NASA's Strategic Capabilities Assets Program



The NASA Langley Research Center (LaRC) Flight Simulation Facilities, located at Hampton, Virginia, consist of the Cockpit Motion Facility, the Differential Maneuvering Simulator, and the Visual Motion Simulator.

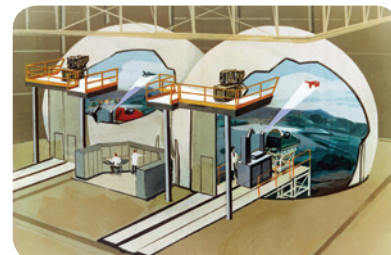
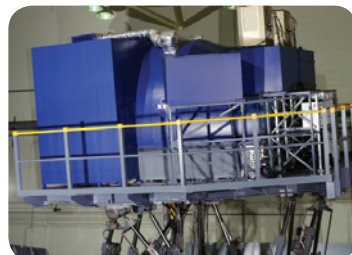
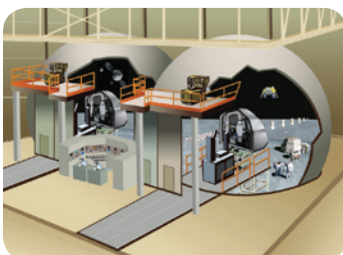
The Cockpit Motion Facility is a multifaceted motion and fixed-base flight simulation research laboratory. It is designed to support aeronautics and spaceflight vehicle research studies in which motion cues are critical to the realism of the experiments being conducted. The Cockpit Motion Facility is made up of four fixed-base simulator sites and one motion-base simulator site. The simulators are the Research Flight Deck Simulator (all-glass reconfigurable cockpit with programmable sidestick control inceptors), the Integration Flight Deck Simulator (conventional transport cockpit with programmable wheel/column control inceptors), the Generic Flight Deck Simulator (all-glass reconfigurable futuristic cockpit with interchangeable programmable control inceptors), and a fourth simulator that is undefined at this time. Each of these simulators is designed to operate as a motion-base simulator for experiments that require motion cueing; however, they can also operate as fixed-base simulators. The Cockpit Motion Facility contains a high-performance state-of-the-art 76-inch six-degree-of-freedom synergistic motion system that utilizes low friction hydrostatic bearing actuators. The simulators are moved from their fixed-base sites to the motion system located in the center of the building through the use of an overhead bridge crane system.



The Differential Maneuvering Simulator is a dual-dome simulator that provides a means of simulating two single-seat fighter aircraft or spacecraft maneuvering with respect to each other. Each dome (40 feet in diameter) contains a generic cockpit with glass instrumentation, programmable control inceptors, 360-degree field-of-view visual system, target image generator system, and area-of-interest high resolution visual system projectors. The simulator can support aeronautics and space research in addition to being used to conduct classified research.



The Visual Motion Simulator is a general purpose simulator consisting of a two-person generic cockpit with glass instrumentation and programmable control inceptors mounted on a 60-inch six-degree-of-freedom synergistic motion system. This simulator supports research studies for all classes of aircraft and spacecraft in which motion cues are critical to the research.



FACILITY BENEFITS:

- World-class, high-performance, state-of-the-art human-in-the-loop flight simulators for all classes of aircraft and spacecraft.
- Can be tied to simulation facilities at other NASA Centers, DOD facilities, FAA facilities, commercial facilities, and university facilities to conduct large-scale multivehicle simulations.

FACILITY APPLICATIONS:

- Aeronautical Research Simulators
 - Commercial transport
 - General aviation
 - Fighter
 - Futuristic designs
- Spaceflight Research Simulators
 - Crew exploration vehicle
 - Crew launch vehicle
 - Lunar lander
 - Planetary lander
 - Lifting bodies
 - Lunar and Mars environments
- System Integration Laboratory
- Classified Research

MOTION SYSTEMS CHARACTERISTICS

Cockpit Motion Facility: Leg Stroke: 76 in / Payload: 22,000 lbs			
Axis	Excursion	Velocity	Acceleration
Vertical	+/- 41 in	+/- 32 in/s	+/- 1.0 g
Lateral	+/- 55 in	+/- 38 in/s	+/- 0.7 g
Longitudinal	+ 67 in/-55 in	+/- 38 in/s	+/- 0.7 g
Pitch	+28 deg/-25 deg	+/- 23 deg/s	+/- 225 deg/s/s
Roll	+/-28 deg	+/- 23 deg/s	+/- 225 deg/s/s
Yaw	+/- 38 deg	+/- 30 deg/s	+/- 225 deg/s/s

Visual Motion Simulator: Leg Stroke: 60 in / Payload: 18,000 lbs			
Axis	Excursion	Velocity	Acceleration
Vertical	+39 in/-30 in	+/- 24 in/s	+/- 0.8 g
Lateral	+/- 48 in	+/- 24 in/s	+/- 0.6 g
Longitudinal	+49 in/-48 in	+/- 24 in/s	+/- 0.6 g
Pitch	+30 deg/-20 deg	+/- 15 deg/s	+/- 50 deg/s/s
Roll	+/- 22 deg	+/- 15 deg/s	+/- 50 deg/s/s
Yaw	+/- 32 deg	+/- 15 deg/s	+/- 50 deg/s/s

COCKPIT CHARACTERISTICS

	Research Flight Deck	Integration Flight Deck	Generic Flight Deck	Differential Maneuvering Simulator	Visual Motion Simulator
Fixed base	Yes	Yes	Yes	Yes	Yes
Motion base	Yes	Yes	Yes	No	Yes
Mission profile	Full	Full	Full	Air combat	Partial
Crew station capacity	2 Pilots / 3 Test engineers	2 Pilots / 3 Test engineers	2 Pilots / 3 Test engineers	2 Pilots	2 Pilots / 1 Test engineer
Programmable control inceptor	Side sticks (SS)	Wheel/Column (WC)	SS, WC, Center sticks (CS)	SS, CS	SS
Visual system FOV	200 x 40 Panoramic 1440 x 1024 Res	200 x 40 Panoramic 1440 X 1024 Res	WAC window (4)	Full 360 degrees	WAC window (4)
Cockpit instrumentation	Programmable displays, 1280 x 1024 Res	B757 Standard	Programmable displays, 1024 x 768 Res	Programmable displays, D-size	Programmable displays, D-Size/Conv

CONTACT INFORMATION

NASA Langley Research Center
 Flight Simulation Facilities
 Mail Stop 125B • 24 West Taylor Street
 Hampton, VA 23681-2199

Jacob A. Houck
 (757) 864-6412

E-mail: Jacob.A.Houck@nasa.gov

Victoria I. Chung
 (757) 864-6406

E-mail: Victoria.I.Chung@nasa.gov