NASA SimLabs News

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Welcome New Subscribers!
If you are receiving this newsletter for the first time, SimLabs News is a quarterly publication reviewing current projects at the NASA
Ames Simulation Laboratories (SimLabs). NASA SimLabs is comprised of three unique Flight Simulators, an Air Traffic Control radar simulator and a high fidelity Air Traffic Control Tower simulator. The facilities support government as well as private industry in a wide array of applications. To find out more, read on!

1. VMS Reveals Handling Qualities of Future Joint Strike Fighter

The Joint Strike Fighter (JSF) F-35 is a next-generation supersonic combat aircraft designed to reduce costs by utilizing a common design with variants to meet a wide range of needs serving the U.S. Army, U.S. Air Force, U.S. Marines, as well as several international partners. NASA Ames SimLabs recently conducted three weeks of simulations runs for the Lockheed-Martin Aeronautics Company, the prime contractor responsible for building the F-35 aircraft. The purpose of the study was to develop and evaluate control laws for the F-35's variant applications using the Vertical Motion Simulator (VMS).

Utilizing its unique motion and visual system cueing capabilities, the VMS is considered a critical element of Lockheed-Martin's design process and allowed test pilots to accurately evaluate handling qualities of the future JSF. Three aircraft variations were tested: Conventional Take Off and Landing (CTOL), Aircraft Carrier Landing, and Short Take Off and Vertical Landing (STOVL).

Joint Strike Fighter (JSF) F-35 in flight

The VMS's unequaled range of motion, up to 60 feet vertically and 40 feet horizontally, and vertical acceleration of nearly 3/4 g, created the highly realistic experience of flying the JSF, especially in carrier and STOVL landings. Studying STOVL operations in NASA's high fidelity simulator was one of Lockheed-Martin's main objectives during the recent simulation runs.

In support of this effort, SimLabs engineers integrated math models developed by the JSF investigation team into the VMS real-time motion system. Start-up configurations were created to expose the pilots to a wide array of environmental conditions that may affect their workload such as crosswinds, turbulence, and ship motion.

Land-based and ship-based

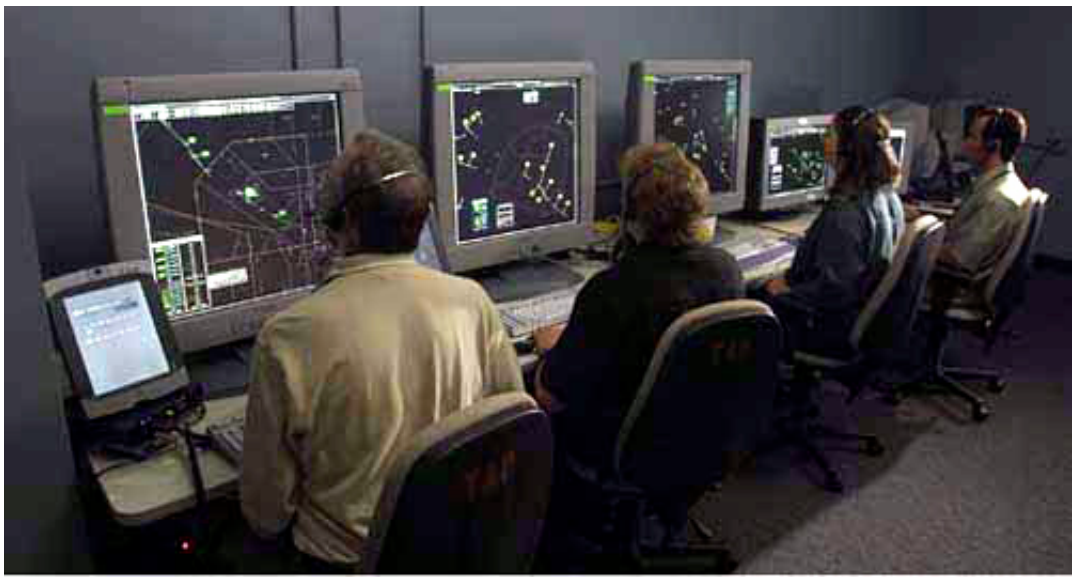
maneuvers were evaluated against specific performance measures. Both contractor and government test pilots performed the evaluations using the Cooper-Harper Handling Qualities Rating Scale and the Pilot Induced Oscillation (PIO) Susceptibility rating scale.

Simulation model of JSF landing on carrier

VMS simulations are scheduled to continue the evaluation of the STOVL control laws. See http://www.jsf.mil/ for more information on the Joint Strike Fighter Program.

2. SimLabs Network Expands to Gate-to-Gate Simulations

In May 2004, NASA will expand its HLA capability by demonstrating gate-to-gate simulations. SimLabs will conduct a two-airport simulation, including the intervening terminal and enroute air space. FutureFlight Central will represent Dallas/Fort Worth International Airport (DFW), and Chicago O'Hare International Airport (ORD) will be represented by an integrated virtual airport component. A new HLA portal will link the Ames Airspace Operations Laboratory (AOL) to the SimLabs' established network of integrated simulators. Transfer of aircraft control will span Center airspace, in addition to previously implemented transfers between the tower and TRACON environments.



TRACON room at the Airspace Operations Lab (AOL)

In February 2004, NASA SimLabs successfully tested the ability to transfer control of virtual aircraft from one simulation to another within a joint exercise. During a 40-minute exercise, an external traffic generator simulated 44 arrivals to DFW. FFC pseudo-pilots took control of all of the arrivals at 15 nautical miles from DFW and landed each flight on the appropriate runway. At the same time interspersed with the arrivals, FutureFlight experienced 24 over-flights and departed 20 flights.

The project is sponsored by the Virtual Airspace Modeling and Simulation Project (VAMS) project.

3. Waiting in the Wings: Real-time Simulation Technology to Address Operational Safety Concerns at SFO

The Federal Aviation Administration and the SimLabs are in the planning stages for developing simulations of the procedures for Simultaneous Offset Instrument Approaches (SOIA) at SFO. SOIA can be used at airports that have runway spacing less than 3000 ft but at least 750 ft apart, to conduct simultaneous approaches to increase the arrival rates in marginal weather conditions. Its usage is dependent upon a high update radar surveillance system known as a Precision Runway Monitor (PRM) which uses a one-second radar sweep and requires dedicated controllers for very precise monitoring of the final approach course. Simulations of various communications strategies will gather data for workload evaluation of pilot, tower and TRACON controllers.

4. Upcoming Events & Conferences

NASA will be participating at the following events:

- 2004 FAA Worldwide Technology Transfer Conference, April 18-21, 2004, FAA Technical Center, Atlantic City, New Jersey. Michael Madson, FFC Deputy Manager to present paper entitled “Controllers and Pilots Play a Key Role in Runway Safety Initiatives Through Real-Time Simulation.”

  More information is available on the conference at: http://www.airportnet.org/depts/meetings/meeting_details.htm?Record_id=19

5. Thinking of Doing Business with NASA SimLabs?

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for more information and to explore what we can do for your needs.

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