

# Fact Sheet



National Aeronautics and  
Space Administration

**Langley Research Center**  
Hampton, Va. 23681-0001

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## NASA Langley Research Center Revolutionizing Aerospace for the Millennium

NASA Langley Research Center in Hampton, Va., has been developing revolutionary aerospace technologies for eight decades. Today, NASA Langley is recognized as a world-class research center performing innovative, high-payoff aerospace and scientific research beyond the risk limit or capabilities of industry.

One of Langley's major efforts is aerospace research, working to improve our air transportation system and develop revolutionary concepts for future aerospace vehicles.

The Center's primary mission assignments are airframe systems and atmospheric sciences. Langley is NASA's center of excellence for structures and materials research as well as the focal point for wind tunnels and test facilities. In addition, Langley manages several critical, high-payoff programs for the Agency.

NASA Langley has the lead responsibility for a national aviation safety initiative. This effort seeks to reduce the fatal accident rate by 80 percent in 10 years and 90 percent in 25 years. To achieve this goal, NASA's Aviation Safety Program is developing advanced, affordable technologies for accident mitigation, accident prevention and aviation system monitoring.

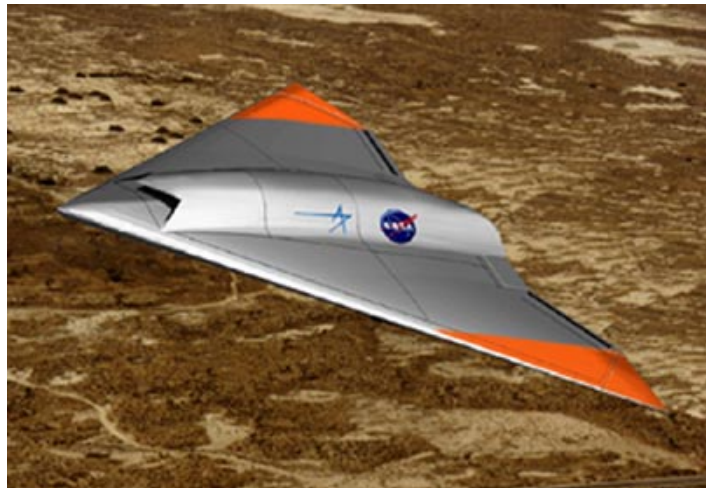
NASA Langley also leads the Aerospace Vehicle Systems Technology Program for the Agency. This program develops advanced tools and testing techniques, pioneers innovative, advanced technologies and provides the basis for future technology programs. The

research efforts include advanced military concepts, self-healing systems, reconfigurable "smart" materials and intelligent flight controls.

Langley also leads the Agency's Intelligence Synthesis Environment Program, whose goal is to develop collaborative tools and environments that will revolutionize the engineering design process.

In addition, Langley leads NASA's aircraft noise reduction research, whose goal is to contain objectionable aircraft noise within the airport boundaries. Having "quieter skies" will reduce delays and improve the quality of life around airports.

NASA Langley plays an increasingly large role in supporting the nation's space programs by developing revolutionary technologies for affordable, advanced space transportation systems, small spacecraft and instruments. This research includes spaceframe technologies that are synergistic with our airframe systems capabilities. In addition, Langley conducts a dynamic program in atmospheric sciences, seeking a more detailed understanding of the Earth's atmosphere.



*Smart vehicle concepts are being used to explore advanced technologies for increasing performance.*

## Research Capabilities

NASA Langley's highly trained technical staff and specialized research facilities enable the Center to perform world-class research that contributes to the economic vitality, security and technical strength of the nation. Langley's research capabilities include systems analysis/integration/assessment, aerodynamics, aerothermodynamics, acoustics, hypersonic propulsion, structures, materials, atmospheric sciences and remote sensing, and airborne systems, including crew station design and integration.

## History

- 1915: National Advisory Committee for Aeronautics (NACA) formed.
- 1917: Langley Memorial Aeronautical Laboratory founded, named after aeronautical pioneer Samuel Pierpont Langley.
- 1948: Name changed to Langley Aeronautical Laboratory.
- 1958: National Aeronautics and Space Administration (NASA) founded; name changed to NASA Langley Research Center.

## Director

Jeremiah F. Creedon

## Physical Statistics

- 788 acres + 20 acres "permitted" by LAFB (East)
- 220 buildings (excluding power stations or trailers)
- \$733M original investment value
- \$4B replacement value on today's market

## Employment Impact

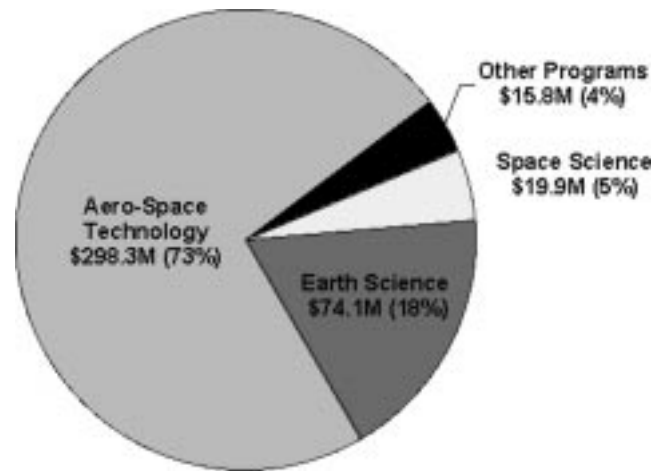
Employment totaled 3,773 as of September 30, 1999, making Langley one of the state's major employers. Of these employees, 2,291 were civil service with a fiscal year payroll of \$184.8M. An additional 1,482 were employees working for 26 contractors on-site or nearby. While civil service employment is expected to remain relatively stable, total jobs are expected to decline to 3,384 by the year 2005.

## Annual Budget (\$M)

FY	NASA-wide	Langley*
1996	13,884.0	629.0
1997	13,708.7	689.5
1998	13,638.0	686.0
1999	13,653.0	631.8

\* Includes Langley programs from other centers

## R&D Funding Program Year 1999



## Langley's FY 1999 Contribution

<b>National economy:</b> .....	<b>\$421.1M</b>
Awards to businesses .....	355.5M
Nonprofit institutions .....	17.8M
Educational institutions .....	47.8M

<b>Virginia economy:</b> .....	<b>\$227.9M</b>
Awards to businesses .....	191.3M
Nonprofit institutions .....	21.7M
Educational institutions .....	14.9M

<b>Hampton Roads economy:</b> .....	<b>\$197.2M</b>
Awards to businesses .....	178.3M
Nonprofit institutions .....	9.5M
Educational institutions .....	9.4M

Note: Hampton Roads figures included in VA figures. According to economists, Langley's total annual impact on the local economy is \$2 billion.

# Accomplishments

NASA Langley research has broken numerous barriers in aerospace while developing high-payoff technologies that have improved the quality of life for all Americans. For example, Langley research has resulted in nondestructive methods for finding cracks and corrosion in aging aircraft, advanced airframe flap designs for quieter aircraft, new composite materials and manufacturing techniques for more affordable aircraft and advanced cockpit technologies for improved situational awareness and weather information.

Langley has also made significant contributions to programs such as Apollo, space shuttle, space station and Mars Pathfinder. Much of Langley's space

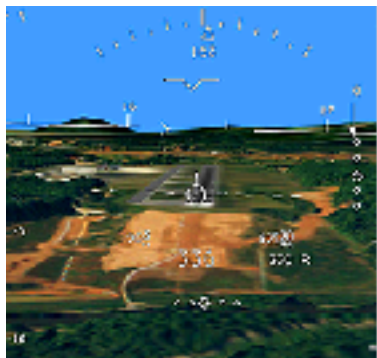
research is focused on making low-cost access to space a reality. In addition, Langley's dynamic Earth Sciences program has improved our understanding of changes in the Earth's atmosphere and provided numerous scientific breakthroughs such as identifying the cause of the ozone hole. The following is a sample of recent Langley accomplishments.

## Aeronautics



**Wake Vortex Prediction** – Langley has developed breakthrough technologies for an Aircraft Vortex Spacing System (AVOSS). The system provides weather-dependent wake vortex spacing criteria for maximizing airport capacity while maintaining safety. Currently, air traffic controllers must apply fixed spacing between different classes of aircraft during bad weather. Because controllers do not have wake vortex predictions, this “spacing” is often larger than required for safe operations. The result is expensive air traffic delays. AVOSS will provide controllers with the first-ever accurate prediction of wake vortex behavior to safely reduce this spacing.

**Synthetic Vision** – Limited visibility is one of the greatest contributing factors in fatal aviation accidents and air travel delays. Langley has teamed with industry and academia to tackle this challenge. Researchers are working to create synthetic vision, a revolutionary cockpit display system that gives pilots a clear electronic picture of the outside world in all weather conditions. Synthetic Vision integrates



Global Positioning System signals with 3-D terrain database images and sensor information. Initial tests of a prototype system flown over Asheville, N.C. demonstrated the technology's potential.

**Crash Testing for Safer Aircraft** – Langley researchers are working to make airplane accidents more survivable. The key to saving lives is understanding the aircraft mechanics and structures as well as the limits of the human body. To do this, Langley researchers recently crash tested a Lear Fan composite aircraft to evaluate improved crashworthiness design features.

They also conducted a detailed study of transport accidents with survivors. The study revealed that survivability could be improved



with changes such as more exits, stronger safety restraints, and better designed fuselages.

**Blended Wing Body** – Air travelers of the future may step onto a double-deck jetliner that resembles a flying wing, which could carry up to 450 passengers to the far reaches of the globe both economically and efficiently. The blended wing body is just one of the futuristic airframe concepts that NASA Langley researchers are studying to expand design options and reduce the cost of air travel.

**Small Aircraft Transportation** – NASA and industry are developing breakthrough technologies to increase small aircraft safety, affordability and ease-of-use. Recent Langley accomplishments include simplified flight controls, improved weather information and an advanced cockpit display that shows the desired flight path after factoring in current weather, traffic, terrain and airspace issues. NASA and industry are also developing technologies to create the infrastructure for a small aircraft transportation system. This system will provide a safe travel alternative, freeing people and products from transportation delays by creating access to more communities in less time.





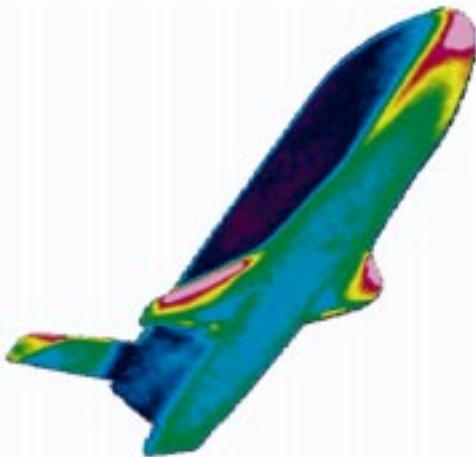
**Runway Friction Improvement** – Ice or snow on a runway is a significant factor in airplane accidents. As part of an international effort, NASA Langley has begun a 5-year winter runway friction investigation. In a major recent accomplishment, the research team developed an international runway friction indexing method. The index is anticipated to become an international standard for assessing winter runway conditions. The index will help prevent accidents and reduce unnecessary delays by providing airlines with the necessary information to make safe take-off and landing decisions during adverse conditions.

## Space Technology

**Next-Generation Spacecraft** – As the NASA center for excellence in structures and materials, Langley was a logical choice to provide research support to the Reusable Launch Vehicle Program. Langley has contributed research on cryogenic propellant tanks, composite structures, metallic and composite thermal protection systems, vehicle systems analysis, aerodynamic testing and analysis and flight controls.

Langley researchers recently performed extensive wind tunnel tests of the X-37 to define the vehicle's aerodynamic shape and flight characteristics. This Mach 25 testbed will be the first orbital experimental vehicle to be lifted to orbit on the space shuttle and

returned to Earth under its own power. Revolutionary technologies like these are essential for developing fully reusable launch vehicles that will reduce the cost of access to space.



## Better than a rocket?

– NASA researchers in the Hyper-X program are developing technologies to expand the boundaries of high-speed flight. The 12-foot Hyper-X aircraft will fly up to 10 times the speed of sound. Flight tests will demonstrate “airbreathing” engine technology that scoops oxygen from the air, eliminating the need for heavy oxygen tanks. A Hyper-X aircraft is potentially more efficient than rocket-powered flight while carrying more payload.



## Atmospheric Sciences

**Ozone Studies** – Langley satellites and aircraft measurements have helped scientists worldwide better understand our atmosphere, solving problems such as the cause of the Antarctic ozone hole. For seven years, the Halogen Occultation Experiment (HALOE) has provided measurements that proved chlorofluorocarbons are the dominant source of ozone-depleting chlorine in the lower stratosphere.

**Weather Information** – Future meteorologists will be able to better predict the weather because of a new instrument being developed at Langley. The instrument, called the Geostationary Imaging Fourier Transform Spectrometer or GIFTS, is set for launch in 2003. It will measure temperature, water vapor, wind and chemical composition of the atmosphere. Information transmitted by GIFTS will be equivalent to that obtained by launching 100,000 weather balloons every minute at intervals of two miles.

## Technology Transfer

Langley is known for unparalleled technology transfer to both aerospace and non-aerospace business sectors. During FY 1999, 128 invention disclosures, 27 patent applications and 28 patents were granted from Langley programs. In addition, 8 licenses were executed bringing the Langley total to 72 and 33 Space Act Agreements were signed. These spinoff technologies have enormous benefit to the public and the local and national economy.