

Glenn Research Center

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Glenn Research Center

- *Glenn Research Center is one of ten major NASA field centers, whose primary mission is to develop science and technology for use in aeronautics and space.*
- *NASA John H. Glenn Research Center at Lewis Field is a NASA center, located within the cities of Brook Park and Cleveland between Cleveland Hopkins International Airport and the Rocky River Reservation of Cleveland Metroparks, with a subsidiary facility in Sandusky, Ohio.*

NASA John H. Glenn Research Center at Lewis Field is a NASA center, located within the cities of Brook Park and Cleveland between Cleveland Hopkins International Airport and the Rocky River Reservation of Cleveland Metroparks, with a subsidiary facility in Sandusky, Ohio. Its director is Janet L. Kavandi. Glenn Research Center is one of ten major NASA field centers, whose primary mission is to develop science and technology for use in aeronautics and space. As of May 2012[update], it employed about 1,650 civil servants and 1,850 support contractors located on or near its site.

In 2010, the formerly on-site NASA Visitors Center moved to the Great Lakes Science Center in the North Coast Harbor area of downtown Cleveland.

History

- *On March 1, 1999, the center was officially renamed the NASA John H. Glenn Research Center at Lewis Field.*
- *It was renamed the Flight Propulsion Research Laboratory in 1947, the Lewis Flight Propulsion Laboratory (LFPL) in 1948 (after George W. Lewis, the head of NACA from 1919 to 1947), and the NASA Lewis Research Center in 1958.*

The installation was established in 1942 as part of the National Advisory Committee for Aeronautics (NACA) and was later incorporated into the National Aeronautics and Space Administration as a laboratory for aircraft engine research.

It was first named the Aircraft Engine Research Laboratory after funding was approved in June 1940. It was renamed the Flight Propulsion Research Laboratory in 1947, the Lewis Flight Propulsion Laboratory (LFPL) in 1948 (after George W. Lewis, the head of NACA from 1919 to 1947), and the NASA Lewis Research Center in 1958.

On March 1, 1999, the center was officially renamed the NASA John H. Glenn Research Center at Lewis Field. John Glenn was an American fighter pilot, astronaut, and politician.

As early as 1951, researchers at the LFPL were studying the combustion processes in liquid rocket engines.

Facilities



GRC Plum Brook Station Spacecraft Propulsion Facility (B-2)

Plum Brook Field Station

- *Space Power Facility*
- *B-2 Spacecraft Propulsion Research Facility: not fully functional*

The 6,400-acre (2,600 ha) Plum Brook Field Station near Sandusky, Ohio is also part of Glenn ($41^{\circ}20'59.4''\text{N}$ $82^{\circ}39'01.8''\text{W}$ / $41.349833^{\circ}\text{N}$ $82.650500^{\circ}\text{W}$ / 41.349833 ; - 82.650500). It is located about 50 miles (80 km) from the main campus. It specializes in very large scale tests that would be hazardous on the main campus.

As of 2015, the station consisted of five major facilities:

B-2 Spacecraft Propulsion Research Facility: not fully functional

Combined Effects Chamber: never used and unusable

Cryogenic Components Laboratory: slated for demolition

Hypersonic Test Facility

Space Power Facility

The Plum Brook Reactor was decontaminated and decommissioned under a 2008 cost-plus-fee contract valued at more than \$33.5 million.

B-2 Spacecraft Propulsion Research Facility

- *The Space Power Facility houses the world's largest space environment vacuum chamber.*
- *The B-2 Spacecraft Propulsion Research Facility is the world's only facility capable of testing full-scale, upper-stage launch vehicles and rocket engines under simulated high-altitude conditions.*

The B-2 Spacecraft Propulsion Research Facility is the world's only facility capable of testing full-scale, upper-stage launch vehicles and rocket engines under simulated high-altitude conditions. The Space Power Facility houses the world's largest space environment vacuum chamber.

Icing tunnel

- *An icing tunnel is capable of simulating atmospheric icing condition to test the effect of ice accretion on aircraft wings and body as well as to test anti-icing systems for aircraft.*

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Zero Gravity Research Facility

- *The Zero Gravity Research Facility is a vertical vacuum chamber used for microgravity experiments.*
- *After the closing of the Japan Microgravity Centre (JAMIC), the NASA Zero-G facility is the largest microgravity facility in the world.*

The Zero Gravity Research Facility is a vertical vacuum chamber used for microgravity experiments. It was designated a National Historic Landmark in 1985. The facility uses

vertical drop tests in a vacuum chamber to investigate the behavior of components, systems, liquids, gases, and combustion in such circumstances.

The facility consists of a concrete-lined shaft, 28 feet (8.5 m) in diameter, that extends 510 feet (160 m) below ground level. An aluminum vacuum chamber, 20 feet (6.1 m) in diameter and 470 feet (140 m) high, is contained within the concrete shaft. The pressure in this vacuum chamber is reduced to 13.3 newtons per square meter (1.3×10^{-4} atm) before use.

After the closing of the Japan Microgravity Centre (JAMIC), the NASA Zero-G facility is the largest microgravity facility in the world.

Another, smaller drop tower remains in use. That tower has a free fall time of 2.2 seconds, and the Dropping In Microgravity Environment (DIME) program is conducted there.

Significant developments

Aeronautics science and technology

- *NASA Glenn does significant research and technology development on jet engines, producing designs that reduce energy consumption, pollution, and noise.*

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Space science and technology

- *A Glenn-derived ion engine was used on the successful NASA probe Deep Space 1.*
- *The Glenn Research Center, along with its partners in industry, are credited with the following:*
- *The Electrical Power System for Space Station Freedom, which, except for minor modifications, is used on the International Space Station.*

The Glenn Research Center, along with its partners in industry, are credited with the following:

The liquid hydrogen rocket engine, which Wernher von Braun credited as being the critical technology leading to the Apollo moon landing

The Centaur upper stage rocket

The gridded ion thruster, which is a high-efficiency engine for spaceflight. A Glenn-derived ion engine was used on the successful NASA probe Deep Space 1.

The Electrical Power System for Space Station Freedom, which, except for minor modifications, is used on the International Space Station.

Significant contributions

List of core competencies

- *NASA Glenn's core competencies are:*
- *Space propulsion and cryogenic fluids management*

NASA Glenn's core competencies are:

Air-breathing propulsion

Communications technology and development

Space propulsion and cryogenic fluids management

Power, energy storage, and conversion

Materials and structures for extreme environments

Education

- *The Glenn Research Center is home to the Lewis' Educational and Research Collaborative Internship Program (LERCIP).*
- *Interns work closely with their NASA mentors and are involved in the daily activities of the Center.*

The Glenn Research Center is home to the Lewis' Educational and Research Collaborative Internship Program (LERCIP). It provides internships for high school and college students and high school teachers. The high school program is an eight-week internship for sophomores and juniors with interests in science, technology, engineering, math, or professional administration. The college level consists of a 10-week internship and is open to college students at all levels. Only residents of the Cleveland area are eligible for high school LERCIP, but college LERCIP is open to students nationwide. Interns work closely with their NASA mentors and are involved in the daily activities of the Center. They are expected to be available to work 40 hours a week for the duration of the internship. The LERCIP Teacher program is a 10-week internship for educators in STEM fields.

Other

- *The winners travel to the Center, perform their experiments, and submit a research report to NASA.*
- *The Dropping In Microgravity Environment is an annual contest held yearly by the center.*

The Dropping In Microgravity Environment is an annual contest held yearly by the center. Teams of high school students write proposals for experiments to be performed in the Drop Tower. The winners travel to the Center, perform their experiments, and submit a research report to NASA.

Future of Glenn

- *After 2004, NASA had been shifting its focus towards space exploration as mandated by the Vision for Space Exploration.*
- *However, the 2015 budget for NASA made substantial increases to projects in which the Research Center participates, such as aeronautics research, planetary science and space technology, and some of that funding was expected to flow down to the Center.*

After 2004, NASA had been shifting its focus towards space exploration as mandated by the Vision for Space Exploration. Because of this, it was perceived by some that regional NASA centers like Glenn, which focus on research and technology, were becoming more and more marginalized in terms of resources and relevance. However, on May 13, 2006, it was announced that NASA Glenn Research Center had secured management of the Crew Exploration Vehicle's service module, which promised to generate billions of dollars and hundreds of jobs for the center. This work secured the center's future in the near term, and signalled a shift in priority for the center from aeronautical research to space exploration, aligning itself closer with NASA's new mission.

Another change of direction created uncertainty in 2010, however, when President Obama and Congress declared the end of the Vision for Space Exploration and sought to chart a new course[clarification needed] for human space flight and NASA. However, the 2015 budget for NASA made substantial increases to projects in which the Research Center participates, such as aeronautics research, planetary science and space technology, and some of that funding was expected to flow down to the Center.



The Apollo Command Module of the Skylab 3 mission being moved to the Great Lakes Science Center

NASA Glenn Visitor Center

- *The new display area at the science center is referred to as the Glenn Visitor Center.*
- *The NASA Glenn Visitor Center features six galleries with interactive exhibits about NASA, space exploration, John Glenn and other astronauts, satellites and the solar system.*
- *The NASA Glenn Research Center also offers public tours of its research facilities on the first Saturday of each month.*

The NASA Glenn Visitor Center features six galleries with interactive exhibits about NASA, space exploration, John Glenn and other astronauts, satellites and the solar system. The center also features an auditorium for lectures, movies and special programs, and a gift shop. Admission is free. Adult visitors must be U.S. citizens and present photo identification.

The NASA Glenn Research Center also offers public tours of its research facilities on the first Saturday of each month. Reservations must be made in advance.

The Visitor Center closed in September 2009 with many displays shifted to the Great Lakes Science Center, and new ones created there. This move was done to reduce the public relations budget and to provide easier access to the general public, especially the underserved community. It was hoped that putting the displays at the much more visited science center will bring the NASA Glenn facility more public exposure. In fact, this proved true: compared to the 60,000 visitors per year at its former site, the Glenn Visitor Center enjoyed

330,000 visitors in the first year at the Great Lakes Science Center. The new display area at the science center is referred to as the Glenn Visitor Center.

References

External links

- *NASA Glenn Visitor Center*
- *NASA.gov: official Glenn Research Center website*

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Engines and Innovation: Lewis Laboratory and American Propulsion Technology (NASA SP-4306, 1991)—The whole book, including photos and diagrams in on-line format.