Aeronautics Research Mission Directorate

Improving aviation safety and efficiency

The first “A” in “NASA” stands for “Aeronautics”—as in the “National Aeronautics and Space Administration.”

Aeronautics has been part of NASA for more than 50 years. Before that, the National Advisory Committee for Aeronautics conducted pioneering research that influenced the design of every U.S. aircraft. NASA integrated that knowledge and existing testing facilities when it was created in 1958.

The Aeronautics Research Mission Directorate, located at NASA Headquarters in Washington, oversees the agency’s aeronautics research, which is conducted primarily at four NASA centers:

• Ames Research Center Moffett Field, Calif.
• Dryden Flight Research Center Edwards, Calif.
• Glenn Research Center Cleveland
• Langley Research Center Hampton, Va.

RESEARCH GOALS
NASA’s aeronautics activities are organized into four research programs and one test facilities management program:

• Aeronautics Test Program
• Airspace Systems Program
• Aviation Safety Program
• Fundamental Aeronautics Program
• Integrated Systems Research Program

For more information about NASA’s aeronautics research activities, establishing a partnership or applying for a scholarship, visit www.aeronautics.nasa.gov.
Each program emphasizes research through collaboration and partnerships, shared ideas and knowledge, and solutions that benefit the public.

NASA works to improve aviation safety and efficiency, and to make aircraft more environmentally responsible. Nearly every aircraft today includes a technology developed from research conducted by NASA or from tests done in a NASA facility.

As demands on the aviation transportation system grow, NASA’s aeronautics research goals include improving airspace capacity, and reducing noise, emissions and fuel consumption.

**AERONAUTICS PROGRAMS**

**Aeronautics Test Program**

The Aeronautics Test Program ensures the availability and accessibility of an extensive suite of ground and flight testing facilities for aeronautics research including laboratories, wind tunnels, flight test beds and other aerospace assessment capabilities. NASA researchers, other government agencies, corporations and institutions use the program’s facilities to test new solutions for everything from jet engine noise reduction to aircraft icing detection.

**Aviation Safety Program**

The Aviation Safety Program focuses on developing cutting-edge technologies and capabilities to improve the safety of the Next Generation Air Transportation System. Its research activities address the particular challenge of increasing safety while also improving efficiency.

**Fundamental Aeronautics Program**

The Fundamental Aeronautics Program develops capabilities for addressing national challenges in air transportation including noise, emissions, fuel consumption, acceptable supersonic flight over land, mobility, and the ability to ascend and descend through planetary atmospheres. The capabilities will enable design solutions for performance and environmental challenges facing future air vehicles.

**Integrated Systems Research Program**

The Integrated Systems Research Program focuses on exploring, assessing and demonstrating concepts and technologies that are integrated at the system-level and then tested in a relevant environment. Its research is coordinated with the ongoing foundational research conducted in the other three aeronautics research programs, and with the efforts of other federal government agencies.

**PARTNERSHIPS**

NASA partners with others to enhance the state of U.S. aeronautics, including major U.S. aircraft and engine manufacturers, U.S. government agencies, universities, non-government organizations, and international partners where the research and cooperation is of mutual benefit to both nations.

**Aerospace Systems Program**

The Aerospace Systems Program works to transform the national air transportation system to accommodate dramatic increases in capacity, efficiency and flexibility. Its research is critical to development of the Next Generation Air Transportation System, which will allow for safe and efficient travel through increasingly crowded skies.

**Aviation Safety Program**

The Aviation Safety Program uses a variety of processes to create formal and informal partnerships including: cooperative or reimbursable Space Act agreements, NASA research announcements or announcements of opportunity, technical working groups or technical interchange meetings.

These are just a few examples of the many partnerships currently underway:

**Industry—working with NASA to:**

- develop computer codes to help detect the accretion of ice on aircraft;
- develop small commercial efficient and quiet air transportation to be introduced during the time period 2030-2035; and
- test noise reduction techniques to someday allow supersonic vehicles to make transcontinental flights.

**International Partners—working with NASA to:**

- investigate causes of, and solutions to reduce, aircraft airframe noise;
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**Universities—working with NASA to:**

- develop multi-scale tools for airspace modeling and design;
- develop smart sensor processing for automatic runway hazard detection; and
- design and test an integrated alerting and notification function for the future intelligent integrated flight deck.

**U.S. Government Agencies—working with NASA to:**

- pursue complementary goals in aviation and space transportation safety, airspace system efficiency, environmental compatibility and international leadership and others;
- transform the U.S. air transportation system into the Next Generation Air Transportation System by the year 2025; and
- conduct research that enables revolutionary capabilities in rotorcraft.

**FUTURE WORKFORCE**

NASA’s Aeronautics Research Mission Directorate seeks to engage and inspire students of all ages through educator training, online education courses, and the development of student programs.

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**NATIONAL AERONAUTICS RESEARCH AND DEVELOPMENT POLICY**
In December 2006, the president of the United States established the first National Aeronautics Research and Development Policy to advance U.S. technological leadership in aeronautics. The goal is to create a vibrant, dynamic research and development community that includes government, industry and academia.

NASA contributed to the development of the policy, its follow-on Research and Development Plan in 2007 and the Research and Development Plan Technical Appendix in 2008. NASA’s aeronautics research goals are fully aligned with these guiding documents and their key principles: focus on cutting-edge research with broad benefits, share research results as widely as possible, coordinate the management of U.S. aeronautics infrastructure across federal departments and agencies, and establish strong partnerships.

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Researchers run a simulation of potential new air traffic management tools at NASA’s Airspace Operations Lab. Image credit: NASA Ames

Simulators play a large role in testing new aviation safety technologies, including this test of a synthetic vision system that creates a graphical representation of the environment outside the aircraft. Image credit: NASA

Test engineer Mark D. Aprax checks a small model of a supersonic jet concept designed by Sukhoi Aerospace and tested in a NASA wind tunnel. Image credit: NASA Langley/Sean Smith

Aeronautics Research Mission Directorate

Navy Facts

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NASA Facts

The next generation of Aeronautics Research Mission Directorate impacts the future of air transportation by researching and developing the next generation of aircraft and technologies. The Aeronautics Research Mission Directorate works to transform the Next Generation Air Transportation System, which will allow for safe and efficient travel through increasingly crowded skies.

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