



NextGen and the Volpe Center

In partnership with FAA and other key stakeholders, the Volpe Center is applying its expertise in engineering, operations, human factors, environmental and energy technologies, and safety management to help design, develop, and deploy cutting-edge aviation systems.

Volpe



U.S. Department of Transportation
Research and Innovative Technology Administration

John A. Volpe National Transportation Systems Center

NextGen implementation has begun

A wide-ranging transformation and modernization of the Nation's air traffic system is underway.

NextGen is designed to reduce congestion, accommodate growth in commercial aviation, and benefit the environment. New systems will detect, analyze, and display real-time, detailed flight and weather data to create common situational awareness and improve decision-making among air traffic personnel and pilots. NextGen will benefit the environment through reductions in carbon emissions, fuel consumption, and noise.

A multidisciplinary Volpe Center team is supporting efforts to accelerate the NextGen components that will yield near-term benefits and provide key support on critical mid- and long-term NextGen programs. ■

Safe

Reliable

Efficient

User-Friendly

Environmentally
Responsible

New York's John F. Kennedy International Airport where the Volpe Center has implemented multiple projects.

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ADS-B: A TECHNOLOGICAL LEAP FORWARD

The Volpe Center provides critical support to FAA's Automatic Dependent Surveillance-Broadcast (ADS-B) program. ADS-B enables a continuous exchange of data messages among aircraft in-flight and to ground stations. ADS-B messages contain aircraft identity, position, velocity, intent, and weather conditions. This real-time data flow is a foundational technology for enabling NextGen improvements. Among its contributions, the Volpe team was instrumental in negotiating the deployment of ADS-B, weather, and VHF communications equipment to offshore oil platforms in the Gulf of Mexico. This will significantly increase the region's airspace capacity by decreasing safe aircraft separation minimums. ■

ADVANCING AIRCRAFT WAKE TURBULENCE RESEARCH

For 40 years, we have been measuring and analyzing wake turbulence and recommending adjustments to aviation standards to improve terminal air traffic safety and capacity. As an example, we helped FAA achieve a recent national rule change to allow dual arrival traffic streams to Closely-Spaced Parallel Runways (CSPR) during low-visibility conditions. Dual streams are authorized at several airports, and are in use at Seattle-Tacoma International Airport (SEA). At SEA, the per-runway capacity increase resulting from the CSPR Arrival project has provided a critical enhancement to the airport's arrival operations.

Another example of our expertise being applied relates to the introduction of the new Boeing 747-8 aircraft model.

We were heavily involved in designing the dedicated flight tests, as well as quality control of the test data under Boeing Commercial Airplanes sponsorship. The dataset was subsequently submitted to the International Civil Aviation Organization (ICAO). The B747-8 wake separation minima has recently been published by ICAO and adopted worldwide. ■

ENHANCING SYSTEM WIDE INFORMATION MANAGEMENT

The Volpe Center is supporting FAA in the establishment of the System Wide Information Management (SWIM) interface, which will facilitate the exchange of critical flight information. We are leading the development effort of the Terminal Data Distribution System (TDDS) and hosting the Integrated Terminal Weather System (ITWS), both SWIM Implementation Programs.

For ITWS, we successfully developed and delivered the first SWIM-compliant weather data feed, enabling traffic managers to adjust flight patterns to accommodate to real-time changes in weather conditions. ■

PROGRAM AND CONTRACT MANAGEMENT

The NextGen System Development Program Office serves as a focal point for Volpe's support to major NextGen implementation programs. It is responsible for providing support to the Air-Ground Digital Data Communications (Data Comm) program, and manages the Traffic Management Infrastructure Systems (TMIS) contract that provides support to major programs, including ADS-B,

En Route Automation Modernization (ERAM), and Advanced Technologies & Oceanic Procedures (ATOP). ■

NEXTGEN FACILITIES SUPPORT

The NextGen Facilities Program is responsible for upgrading and transitioning existing air traffic control facilities to support NextGen's satellite-based Air Traffic Control programs. Building on over 20 years of support to FAA facilities programs, we are supporting the NextGen Facilities Program in the areas of investment analysis, risk management, risk-adjusted schedule development, program planning, air traffic systems engineering, and facilities implementation strategy development. We also support the NextGen Facilities Program with LEED-certified design consulting services to ensure that new FAA facilities meet Federal environmental and energy conservation mandates. ■

THE HUMAN SIDE OF NEXTGEN

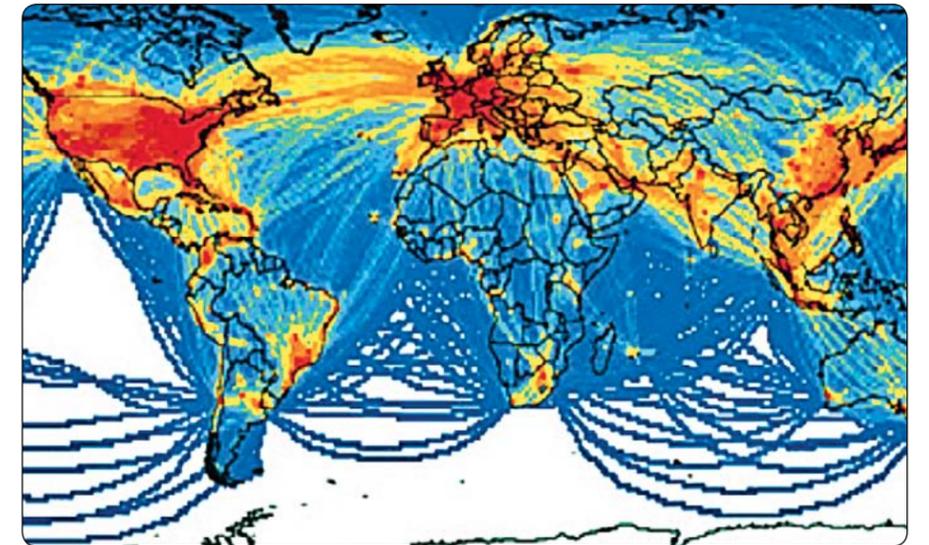
The Volpe Center's human factors research is focused on how pilots, air traffic controllers, and air traffic managers gather information using

current systems, how this process will change as a result of new NextGen systems, and how new systems can be designed to maintain or improve current levels of safety.

Our studies include how NextGen will affect pilots' use of cockpit displays of traffic information, how satellite-based flight routes will affect the need for information, and how that information is conveyed to the pilot. Our human factors team is now developing guidance for analyzing pilot-controller communications under NextGen. ■

MITIGATING THE ENVIRONMENTAL IMPACT OF AVIATION

The Volpe Center, in support of FAA and NASA, is leading the design, development, and maintenance of the Aviation Environmental Design Tool (AEDT), which calculates noise, fuel burn, and emissions at the flight, airport, regional, national, and global levels. AEDT is being integrated with a variety of airspace modeling and design tools and is being used to evaluate the environmental impacts of introducing a wide range of vehicle technologies into the National Airspace System.



The Aviation Environmental Design Tool displays global emissions of carbon dioxide from commercial aircraft. Volpe Center image

In order to meet environmental goals related to carbon-neutral growth and greenhouse gas emission reductions, we lend key support to the FAA co-sponsored Commercial Aviation Alternative Fuels Initiative (CAAFI). CAAFI focuses on bringing aviation stakeholders together to promote the development, environmental and technical assessment, and deployment of alternative aviation fuels. ■

AVIATION MODELING AND SIMULATION

The aviation safety modeling and simulation team at the Volpe Center supports the FAA Flight Standards Service and other FAA organizations with comprehensive simulation and risk-analysis capabilities to evaluate safety and efficiency of a wide range of aviation scenarios. Our simulation environment can represent complex air traffic operations by utilizing detailed models of aircraft navigation, surveillance, automation, airspace, airports, pilots, and controllers. We have extensive post-processing graphical visualization and animation capabilities to evaluate and depict

the safety and efficiency of proposed operations. We have evaluated the safety of closely-spaced parallel approaches and land and hold short operations, as well as the efficiency of proposed surface traffic management methodologies at Chicago, LaGuardia, Atlanta, Boston, and Charlotte airports. ■

FORECASTING AVIATION ACTIVITY

In support of the FAA's Environmental analysis objectives, we are playing a key role in providing forecasts of aviation activity. Utilizing well-grounded techniques, we have produced domestic and international commercial operations forecasts by aircraft category that incorporate aircraft fleet evolution through retirement and replacement. In addition, we have supported the FAA in investigating potential approaches to forecasting aviation network evolution, modeling changes in the distribution of operations by seat class, developing a high-frequency U.S. domestic operations forecasting model, and is currently supporting the development of a global aviation forecasting capability. ■



The application of the Volpe Center's research on wake turbulence contributes to safe and efficient operations. Photo: © AirTeamImages.com

Meet Volpe

Volpe has been helping the aviation community address and resolve its biggest challenges for more than 40 years. As the National Transportation Systems Center, our mission is to improve all modes of transportation by anticipating and addressing emerging issues and advancing technical, operational, and institutional innovations. Part of the U.S. Department of Transportation's Research and Innovative Technology Administration, Volpe is a unique Federal agency that is 100 percent funded by sponsor projects.

Home to a cadre of renowned experts in aviation systems, procedures, and supporting disciplines, Volpe serves the Federal Aviation Administration (FAA) and other sponsor agencies with advanced technologies, research analysis, testing, and program support to ensure a safe, efficient, accessible, and environmentally aware National Airspace System (NAS) that meets national and international interests and enhances the quality of life for the traveling public.

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