

Air transportation

2004 was a challenging year for air transportation. Burdened by rising fuel costs, major airlines struggled financially while low-cost carriers managed to remain profitable. Delays at Chicago's O'Hare airport increased, despite voluntary cuts by its major operators.

However, there were also some positive developments. The FAA's Capstone program realized some operational benefits in terms of increased safety. Work continued on expanding the coverage and operational efficiency of the Wide Area Augmentation System. NASA researchers conducted initial testing of key components of the Distributed Air/Ground Traffic Management concept. And the Dept. of Transportation initiated the process of creating the Joint Planning and Development Office.

Airline economics

U.S. airlines faced many economic challenges, including weak demand and a sustained run-up in fuel prices, trends that turned 2004 into an-

other difficult year for the industry overall. Airlines have taken on a significant increase in debt in order to survive. The average carrier is now well over 90% leveraged (net debt to capital ratio), which means that many air carriers are completely leveraged and unable to obtain capital. Wall Street anticipates losses on the order of \$3 billion or more this year.

US Airways filed for bankruptcy for the second time in an attempt to reduce its costs further. Delta Air Lines, the third largest U.S. carrier, announced a major restructuring to cut \$5 billion in annual costs by 2006 and warned of a possible bankruptcy filing. However, Delta is planning a significant expansion of its low-cost carrier, Song, in spring 2005. A lower cost structure has helped several U.S. carriers, such as Southwest, JetBlue, and AirTran, to outper-

form the legacy carriers. They have remained profitable, although margins have suffered. Europe's low-cost carriers, dominated by Ryanair and EasyJet, grew rapidly despite high fuel prices, to capture a 20% market share. A similar trend is emerging in Asia, where several low-cost carriers are showing signs of strong growth.

Flight delays at Chicago

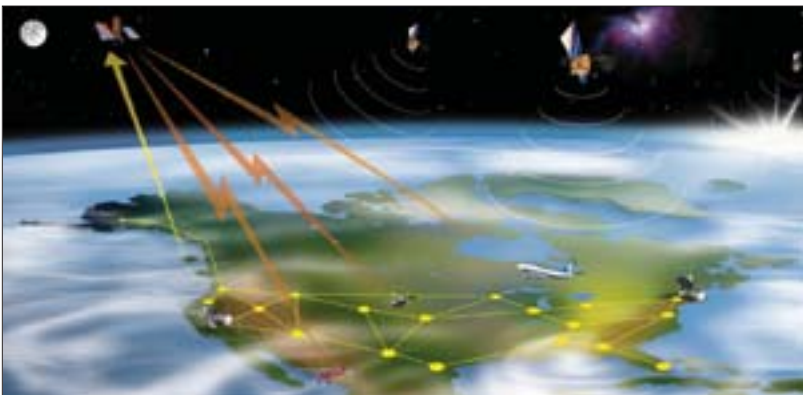
Delays continued to rise at Chicago's O'Hare airport, creating a ripple effect across the U.S. In the first half of the year, the number of late flights at the facility exceeded the full-year totals for 2000, 2001, and 2002. Only 67% of flights arrived at O'Hare on time, and 37% of the delays were longer than 1 hr. American and United, which account for over 85% of flights at the airport, voluntarily agreed in March to reduce flights there during peak times by 5% and again in June by another 2.5%, only to see other carriers fill in the gaps.

The FAA, factoring out weather, saw only a slight increase in on-time arrivals as a result of the voluntary reductions. In August, all scheduled U.S. and Canadian carriers serving O'Hare agreed to voluntarily limit their schedules for the peak hours between 7 a.m. and 8 p.m. to an overall rate of 88 scheduled arrivals per hour, during the period from November 1 of this year through April 30, 2005. The FAA is evaluating the introduction of market-based initiatives, such as slot auctions and capacity pricing, to manage demand at overcrowded airports.

Benefits of Capstone

The FAA is implementing the Capstone program in Alaska to increase pilots' situational awareness via an integrated multifunction display of weather, satellite-based navigation, data link communications, and positions of other aircraft for avoidance. Approximately 200 aircraft were equipped during Phase I of the Capstone program. Installation of Phase II avionics in the Juneau area is under way, and over 60 aircraft have been equipped thus far.

Capstone is paying off in big ways for the people of Alaska, as safety and efficiency gains are already being realized. A recent study published by Mitre CAASD (Center for Advanced Aviation System Development) and the University of Alaska reveals that data collected over the last three years indicate that the accident rate for Capstone-equipped aircraft was 40% lower than for nonequipped aircraft during that period. In addition, accident rates for major carriers and air taxis in the Yukon-Kuskokwim Delta are the lowest they have been since 1990. Sta-



The Wide Area Augmentation System improves the accuracy of GPS.

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tistics also show that in villages where Capstone technology has enabled the use of instrument approaches, weather-related cancellations have been reduced by 50%.

Wide Area Augmentation System

The Wide Area Augmentation System (WAAS) improves the accuracy, availability, and integrity of navigation information provided by GPS, thereby enhancing safety and capacity in the National Airspace System. WAAS, commissioned for aviation use in July 2003, improves GPS accuracy from 20 m to approximately 1.5-2 m in both the horizontal and vertical dimensions. This allows more efficient arrival, en-route, and departure operations.

This year the FAA continued to work toward full operational capability for WAAS, to include a full complement of geosynchronous satellites. This will ensure that each receiver sees at least two WAAS satellites at all times throughout all of the continental U.S. and most of Alaska. The FAA is also working with Canada and Mexico to expand the coverage area to support North American implementation of WAAS.

In addition, software and hardware upgrades have been under way to make the system more efficient and deliver increased operational performance in the future. Activities completed to achieve the next phase for WAAS will serve as a springboard on the path to future WAAS capabilities. Although designed for aviation users, WAAS supports a wide variety of other uses, including agriculture, surveying, recreation, and surface transportation.

Air traffic management

NASA researchers are studying ways to improve flight efficiency, increase airspace capacity, and reduce flight delays as demand for air travel continues to grow in the future.

One promising approach is to use technology on board aircraft to supplement air traffic control (ATC) systems. NASA laboratories on opposite sides of the U.S. this summer tested research prototypes of new air traffic management technology. In a joint simulation at the NASA Langley Air Traffic Operations Laboratory in Virginia and the NASA Ames Airspace Operations and Flight Deck Display Research Laboratories in California, real-life pilots and air traffic controllers put key components of the Distributed Air/Ground Traffic Management (DAG-TM) concept to the test.

DAG-TM promises increased flight efficiency, airspace capacity, and operational flexibility for aircraft operators. NASA researchers integrated sophisticated computer software for



The FAA's Capstone program, which features a multifunction display, realized some safety benefits this year.

“autonomous flight management” with modern cockpit systems to give flight crews the ability to plot their best flight paths. The on-board system allows aircraft to maneuver safely around weather, traffic, and other airspace hazards while still meeting traffic flow constraints issued by ground-based controllers.

During the simulation, advanced ground-based systems for ATC were also tested. NASA researchers have developed computer software that assists air traffic controllers in planning the traffic flow and managing aircraft not equipped with the autonomous flight management system.

Preliminary results indicate the possibility of increasing airspace capacity by distributing some ATC tasks to the flight crew. This research was funded and managed by NASA's Advanced Air Transportation Technologies Project, under the Airspace Systems Program.

JDPO

The Dept. of Transportation is spearheading the development of a multiagency initiative that will produce and implement a unified national plan for transforming the U.S. aviation system. The Joint Planning and Development Office (JPDO) for the Next Generation Air Transportation System is led by executives from the Depts. of Transportation, Defense, Homeland Security, and Commerce, along with NASA and the FAA.

The focus of the transformation is to overcome impediments to the continued growth and development of aviation, ensuring that the U.S. airspace system has the capacity, flexibility, and security it will need in the future. The primary first-year product of the JPDO will be a national plan. This living document will serve as a roadmap and tool for dialogue to capture the steps necessary to enable the transformation for the full range of stakeholder missions. ▲