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Current operational trials of an innovative Air Traffic Management (ATM) concept developed by Boeing [NYSE: BA] -- called Tailored Arrivals -- are indicating that the concept can help aircraft save significant amounts of fuel as they approach an airport for landing.

The San Francisco-based trials, like previous ones in Australia and in The Netherlands during the past two years, indicate fuel savings from 400 pounds (180 kilograms or approximately 60 gallons) to 800 pounds (360 kilograms or approximately 120 gallons) per flight.

"The implication of these studies is that, when fully implemented, Tailored Arrivals could save airlines \$100,000 per year in fuel costs per aircraft for flights into major airports," said Rob Mead, Boeing Phantom Works lead engineer for advanced ATM air/ground communications.

Boeing is conducting the trials at San Francisco International Airport under a joint program with the National Aeronautics and Space Administration's Ames Research Center at Moffet Field, Calif. In addition to NASA Ames, Boeing is working with United Airlines, the Federal Aviation Administration's Oakland Air-Route Traffic Control Center, Northern California Terminal Radar Approach Control, Sensis Corp., Lockheed-Martin Corp., and San Francisco International Airport authorities to complete the oceanic Tailored Arrivals trials.

The first set of trials at San Francisco included 17 flights with United Airlines 777-200 aircraft from Aug. 17 to Sept. 6. A second set of trials at San Francisco with 777 and 747 aircraft is scheduled to start in late October.

These are the latest in a series of such studies by Boeing around the world that show that Tailored Arrivals can increase airspace capacity; maintain airline schedule integrity; reduce fuel consumption, emissions and noise; and ease the workloads of controllers and pilots. The San Francisco study is evaluating oceanic Tailored Arrivals -- or Tailored Arrivals approaches from the ocean.

The United Airlines 777 aircraft used in the trials received clearances that stretched from their oceanic control sector all the way to their arrival runways. Clearance delivery took advantage of the FAA's new Ocean 21 system, which utilizes the FANS-1/A integrated data-link system. FANS-1/A is a suite of air / ground data-link applications that air traffic services use to deliver aircraft position, intent and weather data to Air Navigation Service Providers (ANSPs). It allow aircrews and air traffic controllers to make requests as well as deliver and acknowledge instructions related to air traffic control (e.g. changes in route).

"Our studies of Tailored Arrivals around the world are showing that this concept enables airlines to operate more efficiently," Mead said. "As they fly these optimized profiles, aircraft operators can more fully utilize the capabilities of their aircraft to significantly reduce noise and environmental impact around airports as well as reduce their fuel costs." Tailored Arrivals also enable pilots to fly airplanes as they were designed to be flown, which helps reduce crew workload and errors, Mead said.

Rich Coppenbarger, NASA Ames principal investigator for oceanic Tailored Arrivals, said that "early reaction from pilots and controllers to the oceanic Tailored Arrivals concept has been very encouraging. We are developing the automation tools and procedures to help controllers strategically anticipate and solve arrival problems well in advance, allowing for more ideal descent approaches, especially during busy traffic periods where potential benefits are greatest."

During a Tailored Arrival, data-link technologies establish a four-dimensional flight profile between an air traffic control facility and the flight deck of an approaching aircraft when it's ready to begin its descent, about 140 miles away from final destination.

The flight crew uses the auto-load function to transfer the profile into the aircraft's Flight Management System (FMS) for review. Once the crew accepts the profile and confirms they will fly it, the FMS flies the given trajectory to touchdown with considerable accuracy. Rather than a traditional vectored, step-down approach in which pilots must abandon the aircraft's built-in automation, the Tailored Arrivals profile is an efficient, predictable, continuous descent. Both airborne and ground systems have the same descent plan, and pilots and controllers have minimal need for voice communication as they make maximum use of modern aircraft capabilities.

An important objective of the San Francisco trials is to validate capabilities of NASA's Enroute Descent Adviser (EDA), which computes fuel-efficient descent solutions when there are complex traffic constraints and airspace restrictions. Specifically, the trials are examining the EDA's ability to predict trajectories and make adjustments to flight profiles and arrival times, and to coordinate and execute these trajectories across multiple air traffic control sectors and facilities.

The Tailored Arrivals concept represents a significant step toward ATM solutions that can be part of the U.S. Next-Generation Air Transportation System and the Single European Sky ATM Research program, said Kevin

Brown, Boeing Phantom Works vice president and general manager of Advanced ATM. "Our work in this area stems from a strong commitment to global interoperability. We are working toward a global ATM system that leverages shared precision information to ensure efficient, safe operations."

The Boeing Phantom Works Advanced ATM team is dedicated to providing innovative solutions that dramatically increase the efficiency, safety and security of air traffic systems throughout the world. Phantom Works is the advanced research and development unit and catalyst of innovation for Boeing. It provides advanced solutions and innovative, breakthrough technologies that reduce cycle time and cost while improving the quality and performance of aerospace products and services.

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