



# Backgrounder

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Boeing Commercial Airplanes  
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## **Airplane Health Management: Information and insight when time is of the essence**

At Boeing, we know that a healthy airplane is a productive, safe airplane. More importantly, so do our customers, who depend on reliable, efficient airplane fleets to keep their operations moving, generate revenue and satisfy their passengers.

Once an industry dream, the ability to monitor airplane systems and parts, and to interactively troubleshoot issues in flight, is now reality. Boeing's innovative and industry-leading approach to integrated vehicle health monitoring – called Airplane Health Management (AHM) – is one of the most widely used and useful information tools available.

AHM currently is in service with 53 airlines worldwide, on board nearly 2,000 airplanes. About 75 percent of all 777s and 50 percent of 747-400s are equipped with the system. It is also a standard feature in the first year of operation on the 787 Dreamliner, the world's most-advanced jetliner.

No one knows airplanes like Boeing knows airplanes. AHM combines nearly 100 years of Boeing aviation and operations experience with advanced analytic and diagnostic technology to provide customers with the information and visibility they need to keep their fleets flying.

### **Value-added solutions**

AHM is an offering of the Boeing Edge, the industry's largest services portfolio as well as a key component of the company's digital airline strategy. A digital airline connects data, information, people and technology across its enterprise to extract the insight it needs to resolve issues, create efficiencies and make the best possible business decisions.

Flight delays and cancellations are extremely costly for airlines. Trimming minutes from delays or cancellations – or better yet, preventing them altogether – contributes significantly to an airline's bottom line. And this doesn't take into account the financial impact when passenger satisfaction decreases.

Armed with AHM information, airline operations teams, in consultation with Boeing if needed, can make important maintenance decisions, such as the feasibility of converting unscheduled maintenance to scheduled maintenance. The former is costly; the latter, routine and built into an airline's overall operations plan.

Here's a summary of AHM benefits to an airline, which add up to significant savings:

- Reduces schedule interruptions.
- Reduces unscheduled maintenance.
- Improves maintenance efficiency.
- Provides fleet status across the airline enterprise.
- Provides real-time visibility of aircraft maintenance requirements.

## **How AHM works**

While the aircraft is in flight, data from onboard systems and engines is captured and transmitted in real time to the airline's ground operations.

When issues surface, airline personnel receive alerts delivered through the Internet, email, fax or pager services. Teams can then access and process the information with Boeing-hosted tools on MyBoeingFleet.com, Boeing's secure Internet portal for airplane owners and operators and their service providers. Airline teams receive comprehensive reports and information customized according to need, priority and urgency.

On the ground, AHM helps airlines make maintenance decisions with better information in a fraction of the time that would otherwise be needed. This means airplanes and passengers are back in the air as soon as possible.

## **AHM architecture**

Boeing's AHM system comprises three modules: Real-Time Fault Forwarding, Custom Alerting and Analysis, and Performance Monitoring.

*Real-Time Fault Management* – When an airplane is en route, in-flight faults are communicated to the Boeing and airline operations centers and diagnosed, allowing airlines to make real-time decisions about maintenance and to deploy the necessary people, parts and equipment to mitigate the issue. Diagnostics are facilitated by two-way manual and automatic communication between the ground and airplane.

*Custom Alerting and Analysis* – This allows airlines to receive an unlimited number of customized alerts and analysis according to the unique needs of their fleet. Over time, these can be modified to reflect changing fleet composition and demographics. This feature monitors service levels, such as fluids and oxygen; operational exceedences, such a flap extension speed and hard landings; and indicators of developing system issues.

*Performance Monitoring* – This system monitors fuel consumption and CO<sub>2</sub> emissions. This feature is especially critical because fuel and oil account for roughly 30 percent of an airline's costs, and top environmental concerns include greenhouse gas levels.

## **Boeing Operations Centers**

At Boeing, no one flies solo. The company's Operations Centers are staffed 24/7 to provide support to airline operations teams. When the centers receive data from the AHM system and other sources, Boeing responds quickly and proactively engages suppliers, technical experts and engineering resources to provide customers with information, guidance and solutions.

## **The 787 Dreamliner – New airplane, new opportunities**

The 787 Dreamliner has completed one of the most exhaustive and extensive flight test and certification programs in aviation history. Airplane Health Management has been onboard since the beginning.

Boeing and 787 operators continually monitor and evaluate AHM data so that we can understand operational issues and gather the data needed to analyze, eliminate, avoid and mitigate schedule interruptions. This has enabled Boeing to support customers in near real-time when an event occurs. For example, when a software issue with flight control messaging – discovered through AHM – began to cause delays in the fleet, it became clear that the company should not wait for the next naturally occurring software update to address the issue. Boeing updated the software immediately.

Boeing is also able to share knowledge gained on one airplane with the rest of the fleet through quick links into the Boeing maintenance manuals, maintenance tips and other service-related information provided by Boeing systems experts and engineers.

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