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TECH REPORT

Securing the Best EFB Applications

Airlines and flight crews long have realized the benefit of replacing the 30-plus pounds of paper in a traditional flight bag with electronic versions of these documents and an electronic delivery system, commonly called an electronic flight bag (EFB). Now, thanks to emerging technologies and regulatory guidance, the EFB is an operational reality. EFBs, however, remain relatively new, which is why operators should be aware of the different functions the devices can provide. Drawing on its long history as a provider of aeronautical charts and data, Jeppesen offers operators an array of EFB solutions, many of which are described in the following guide.

Access Intelligence

All airlines seek ways to manage data more efficiently. EFB applications can streamline the data delivery and update process, bring added safety benefits not possible with paper, save fuel through reduced weight, and offer reduced print and distribution costs. In short, EFBs are better, faster and cheaper than their paper-based counterparts and form one component of an operator's total information management solution.

Throughout 2004 Jeppesen and several partner-vendors conducted proof-of-concept testing with several major airlines. Test results were positive, yielding several benefits, including improved safety, pilot good will, pilot efficiency and improved situational awareness. In fact one pilot conducted his own individual test and found that, with his EFB, he could find the information he needed for a runway change in just 32 seconds, while it took more than five minutes, using the traditional paper-based documents and manuals.

A key benefit an operator should consider is the ability to deliver data to EFBs quickly and securely via wireless connections or other electronic methods. Imagine updating an entire chart database of an airline fleet with the click of a button. It beats the current labor-intensive procedure, especially for the pilots who are tasked with hand filing thousands of revised sheets per year.

Although electronic delivery is clearly the future, airlines will face challenges they do not encounter with paper-based information. Back-end EFB applications must ensure security, proper configuration management, and the utmost levels of dependability. Such systems should provide the back-end delivery and management mechanism for applications, data and configuration files. They should acquire, assemble and deliver a complete package of content from providers to users electronically. The delivery is generally unidirectional from content providers to customers, with bidirectional flow used for the delivery of logging, confirmations and problem reports. The result is decreased media production and substantial cost savings.

Back-end EFB applications, such as Jeppesen's Data Distribution and Management system, generate reports that provide airlines with critical information. They typically: verify that the content packages have been published, notify airline personnel that content packages are waiting for review or have been reviewed, show events associated with a content package or a tail (aircraft), and provide flexible reporting for customer-generated reports.

EFBs can include taxi moving maps.

Jeppesen's partners provide the expertise necessary for Class 1 and 2 EFBs to use an occasionally connected computing (OCC) model between the client and back-end servers. Pilots need no specialized technical expertise, nor even be concerned with updates and connectivity; the EFB handles the update process automatically. When the EFB finds a wireless connection, it automatically finds updates and installs the updated information. This happens wherever the device is able to connect to the network. It could be at the gate, an airport terminal or even a coffee shop. If the connection is lost, the EFB system reconnects automatically and resumes operations without loss of information.

Real-Time Updates

Data security with a removable EFB should be handled at many levels, with encrypted data, secure connections and passwords on the mobile device. As a last resort, a system administrator should be able to remotely erase all the data from the EFB, should the device be lost or stolen.

Other data delivery methods are on the horizon. Jeppesen's president, Mark Van Tine, recently demonstrated a complete in-flight update to a Jeppesen electronic chart application. While traveling from Europe to North America, he sent the following message to the development team: "I am sending this in real time from FL340 over Iceland to tell you that I just completed a full database update, using the Connexion by Boeing in-flight Internet service...The database on this PC was out of date by 70 days, hence the file transfer was much larger than normal. Still, it was a complete success." In-flight Internet service providers, such as Connexion by Boeing, open a whole new world for real-time data delivery–everything from passenger e-mail to entertainment to chart data, when and where the operator needs it.

Many options exist for EFB hardware, which is why EFB software should remain neutral to various manufacturers' products. An EFB can be anything, from an off-the-shelf tablet PC or laptop, to a ruggedized tablet PC designed for industrial use, to a specialized tablet PC that is optimized for use in the cockpit.

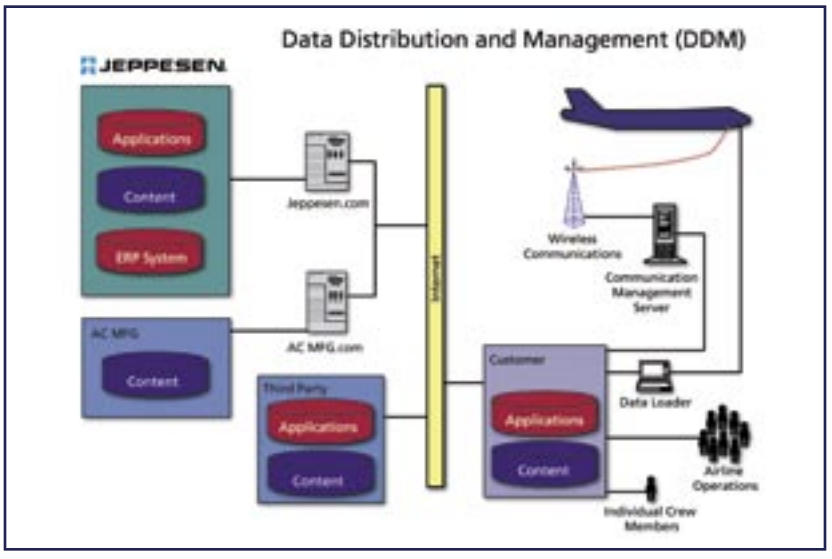
Three Classes of EFBs

FAA and Europe's JAA define three classes of electronic flight bags (EFBs):

Class 1–These systems generally make use of commercial-off-the-shelf (COTS) equipment, including laptop and tablet PCs operable in both landscape and portrait modes. They are fully portable and do not deliver data to or receive data from the aircraft's avionics. JAA refers to these systems as controlled PEDs.

Class 2–These systems generally are COTS-based but may use equipment that is purpose-built for aviation. They are portable but connected to the aircraft by a mount during normal operations. They may receive data from but do not deliver data to the aircraft. FAA requires an administrative control process for approval. JAA considers these EFBs to be controlled PEDs and requires airworthiness approval.

Class 3–These fully installed systems are not portable. Both FAA and JAA require airworthiness certification covering hardware installation and qualification, and software qualification. Consideration should be given to human-computer interface.



Since an operator will select the most suitable hardware for its operation, the accompanying software should accommodate this choice. As an example, consider the PC market. While many manufacturers offer computers with various features, in most cases the processor is the same. Consumers have come to recognize that having "Intel Inside" means reliable performance, regardless of who manufactured the hardware. Similarly, by having software such as Jeppesen OnBoard, EFB operators can be assured of reliable performance regardless of aircraft or computer hardware type.

More than hardware-neutral, EFB software also should be airframe-neutral. After all, paper charts have long been trusted on board everything from transport category airplanes to single-engine, general aviation airplanes. Jeppesen has adopted an airframe-neutral philosophy, recognizing that its customers often operate mixed fleets of aircraft from multiple manufacturers. For instance, even though it is a Boeing subsidiary, the company also works with Airbus. In mid-2004 Jeppesen and Airbus declared a working partnership though a memorandum of understanding. The two companies are working together to develop forward-fit EFB applications for the new A380 and retrofit solutions for the A320/A330/A340 families of aircraft.

More Than Charts

EFB applications also should be designed to grow and adapt to an airline's requirements. Scalability will be a prime concern, as airlines have indicated they will adopt EFBs over time and in a phased approach. Operators, therefore, should be able to add functionality easily and without costly certification activity. In addition, electronic data solutions also should support all operators, from a small commuter airline to a major carrier with global operations.

Jeppesen EFBs

Jeppesen has partnered with several companies to bring integrated, turnkey Class 1 and 2 electronic flight bag (EFB) solutions to market. It also works closely with its corporate parent, Boeing, to provide software and applications for the aircraft manufacturer's fully integrated Class 3 EFBs, which are deployed to and in service with customers around the world. This collaboration was a key factor in Boeing's certifying the first Class 3 electronic flight bag, in October 2003 for the B777, which is in service or slated for installation with KLM Royal Dutch Airlines, Malaysia Airlines, Emirates Air and others. The Jeppesen suite of EFB applications forms only one spoke in an overall portfolio of services. This portfolio includes:

- E-Link, an Internet chart delivery system,
- OPSControl, an operations management system,
- Document management services, and
- A full array of weather services.

Most pilots typically think of charts when EFBs are mentioned. In reality, these devices offer much more. In addition to rapid access to a worldwide library of tailored charts, EFBs offer added safety and functionality features, which are not possible with paper. For example, pilots should be able to quickly and easily organize electronic charts in a logical sequence, as well as assemble a chart clip or a bundle of charts that may be needed for a particular airport. Say, you get a runway change from air traffic control on 3-mile final. With an appropriately fitted EFB, the necessary data would be retrieved fast and efficiently from the electronic chart clip. EFBs also should include a night viewing mode.

Flight operations and airplane manuals also can be stored and accessed electronically on an EFB. A document viewer provides rapid and easy access to information, reducing the look-up time for pilots.

In addition, most EFBs include an electronic performance calculator that provides real-time calculations of takeoff and landing performance, including V speeds, maximum landing and takeoff weights, and engine power settings. Safety, therefore, is improved because pilots are able to generate much more precise performance numbers with an EFB vs. the old pencil and paper method.

Arguably, one of the most exciting advances for EFBs are taxi moving maps. Currently only available on Class 3 EFBs, such as those certified by Boeing for use aboard the B777, these applications help prevent runway incursions. The highly detailed, geo-referenced charts greatly enhance situational awareness by showing the flight crew exactly where the aircraft is in the airport environment. Crews can even zoom to detail levels that display gate and taxiway designators, and even hold-short points. The aircraft position is generated by GPS inputs, giving crews their exact location on the airport surface while showing them their position relative to runways, taxiways, buildings, etc.

Runway incursion prevention, rapid performance calculations, real-time data updates and secure data distribution are among today's EFB applications. But as more and more operators of all sizes and from around the world employ these useful devices, additional applications are sure to evolve.

As Easy As 1, 2, 3

Electronic Flight Bag
by JEPPESEN

Jeppesen's EFB provides a flexible, scalable platform to deploy EFB applications and data that will grow with you as your needs evolve.

Class 1

Class 2

Class 3

Less paper; increased safety and efficiency; rapid ROI. Jeppesen's EFB makes it as easy as 1, 2, 3.

Get more information at:
303.328.4422 *(Western Hemisphere)*
+49 6102 5070 *(Eastern Hemisphere)*
www.jeppesen.com/efb

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