WHITE PAPER

Connected Cockpits: Using Tablets in the Air

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SUMMARY

Given the weight of paper-based flight books and the labor intensive nature of managing paper-based documents, professional pilots have been moving towards tablet based electronic flight bag (EFB) solutions for their cockpit computing needs. Early experiments with popular tablets haven't always worked as expected, however, leading airlines to now seek alternatives that can better meet the demands of the cockpit flying experience – easy access to navigation and charts, real time weather information, and automatic content updates. Airlines recognize the need to provide pilots with the most effective tools they can possibly get their hands on to ensure the enhanced safety and security of their passengers and their crew.

> "The electronic flight bag on the Surface Pro 3 allows us to synchronize a wide range of the latest data, information and flight-related documentation prior to the flight, meaning it is then available offline during the flight. The immediate availability of manuals, charts or checklists consisting of several thousand pages enormously increases the ability to take action in the information at their fingertips right when they need it."—Dr. Philipp Haller, Austrian Airlines

INTRODUCTION

Professional pilots have very demanding roles that require time-critical access to an enormous amount of data from navigation charts, weather depiction, flight path, operational specs and other types of information. Traditionally, many of those needs, particularly with regard to navigation, flight path, and operation, were met with extremely dense, heavy sets of paper charts, plates, manuals and other large binders carried in large briefcases that could weigh as much as 35 pounds. Not only are these bags difficult to carry and maneuver with, they're also extremely labor- and time-intensive to manage. Each chart revision can take 10-20 minutes to accomplish.

Not surprisingly, pilots and their airline employers have been eager to find an electronic alternative that would reduce the burdens associated with the paper based flight bags, including:

- The potential health hazards of constantly carrying these large flight bags;
- Reducing fuel consumption caused by this extra weight;
- Significantly decreasing paper usage, and, most importantly;
- Providing navigational and operational information that can be updated dynamically to compensate for rapidly changing conditions.

The ability to offer electronic versions of emergency manuals as well as dynamically updated charts are particularly important tools for pilots, as they help enhance the safety and security of the entire flight experience.

Many pilots and airlines began experimenting with tablets such as the Apple iPad and other electronic book readers to see if they could find a solution that would deliver the same content but in a more lightweight and digital format. While there was some degree of success, these new devices also brought with them new sets of questions and challenges.

First, at a most basic level, were these devices safe to fly with in the flight deck during the entire flight and would they avoid interfering with the plane's onboard controls? Would they offer the legibility and clarity of a paper chart or plate? Could they tap into existing systems? How would they be managed and updated from an IT perspective? These and many other important questions didn't always have clear, easy answers during some of these experimental trials.

Now that time has passed since some of these initial cockpit deployments, it's also become increasingly clear that simply putting a map onto a tablet screen isn't enough. Pilots want more than just a basic tablet in the cockpit. New user needs, including a desire for side-by side

app capabilities and larger screen real estate have emerged. Airline IT personnel, on the other hand, want to be able to securely manage and update any devices that connect to their networks or their planes and want to be able to do it with tools and within frameworks with which they are familiar.

Clearly, a new approach that offers these customers greater benefit for their investment is needed. .

THE SURFACE PRO 3

Microsoft introduced their Surface Pro 3 computing device in June of this year with the idea of combining all the capabilities of a tablet and a notebook computer into a single device. Commonly referred to as a "2-in-1" in tech industry parlance, the Windows-based Surface Pro 3 features a large, high-resolution12" touch-sensitive display, a detachable keyboard available in several colors, and a bundled Surface Pen that can be used for more precise input. Leveraging Intel's fourth generation Core i-Series processor, the Surface Pro 3 currently runs Microsoft's Windows 8.1 operating system and offers up to nine hours of battery life in a 1.76-pound package.

Microsoft Surface Pro 3

Though designed as a general purpose computing device, these specs and the device's compatibility with aviation-focused applications makes the Surface Pro 3 very well-suited for use in a connected flight deck. Plus, by combining the capabilities of a tablet and a notebook in a single device, it can reduce costs for organizations that have been purchasing two devices per person.

First, and most important, Surface Pro 3 qualified for authorization for use as an EFB during all phases of flight, as defined by both the Federal Aviation Administration (FAA) and European Aviation Safety Agency (EASA). Through this assessment process, Surface Pro 3 completed rigorous environmental and situational tests, satisfying a lengthy and important part of the FAA authorization process. This pre-certification work isn't necessarily conducted by all device manufacturers and, as a result, airlines who choose to deploy Surface Pro 3 will be saved the time and energy needed to qualify the device at the most basic level. In addition, this authorization means it can be used during the entire timeframe in which a pilot is in the flight deck, and not just as a glorified electronic map reader during flight. This is particularly critical at altitudes below 10,000 feet, where these kinds of devices can really prove their worth.

The high resolution, greater than HD (2,160 x 1,440 pixels) display features a 3:2 aspect ratio (horizontal to vertical resolution). This squarer screen size translates into a more map and digital-book friendly format than the rectangular widescreen TV-style 16:9 aspect ratio found on some tablets. This makes charts, plates and many other documents easier to read at a glance, particularly with the 12" screen size. The LCD layer of the screen is also directly bonded to the touch layer, avoiding the air gap commonly found on many tablets. This translates into a brighter, easier-to-read screen and helps avoid some the slight shadowing that can occur in direct sunlight on screens that have an air gap. Given the dynamic and often very-bright sunlight in a flight deck, this can be the difference between being able to clearly read a screen or not when a pilot really needs to have that capability.

A SMARTER TABLET

One of the challenges with many existing tablets is that they can only actively show one application at a time. Given the smaller screen sizes of many devices, this makes operational sense. But pilots often need to simultaneously view multiple applications, such as dynamic weather information alongside flight path data or dynamic maps alongside plane manuals. By taking advantage of the multitasking abilities within Windows, pilots can launch and run whatever set of applications they want and size each application according to their own needs.

In some instances, pilots may also need even more fine-grained control and precision than they can get from their fingers when navigating a detailed map or charting out a weather-induced alternative flight plan. In addition, some touch-based displays can't function if the pilot is wearing gloves. For those situations, the Surface Pen bundled with the Surface Pro 3 can offer an alternative that other tablet solutions don't offer as standard. The Surface Pen can be used to make personal notations on charts, highlight critical details in a flight plan, jot down notes or for many other potential uses. For many professional pilots, these kinds of personal jottings can be extremely important, both for themselves and to pass onto other pilots.

Another key feature is connectivity. The Surface Pro 3 includes built-in support for USB 3.0, as well as a micro-SD card reader and a mini-DisplayPort connector for connections to larger monitors. Thanks to a partnership with navAero, a leader in developing and commercializing cost effective electronic flight bag products and deployment solutions, Surface Pro 3 can also be directly mounted into a flight deck via a mount that not only holds the tablet in a convenient viewing position, but provides direct connection for power and connectivity to the plane itself. Leveraging the ARINC bus found on many commercial planes and the unique Surface Pro 3 power and docking connector, the navAero EFB mount now allows real-time data from the plane's systems—from weather and turbulence to engine performance and

much more—to be fed directly into the Surface Pro 3. Applications running on the device can leverage this data to provide pilots with a comprehensive view of their plane's systems' status, adjustments to flights plans based on weather, and much more.

A WINDOWS NOTEBOOK

In addition to its capabilities as a tablet, the Surface Pro 3 is a full Windows-based PC. That means it's got all the connectivity options and peripheral support of a PC and it can run any Windows-based application, from Microsoft Office to custom enterprise applications to aviation-focused programs. By tapping into the very large and well-established Windows ecosystem, the Surface Pro 3 provides important advantages both for airline IT organizations that may want to deploy existing Windows applications in use by their organization, as well as to pilots who can enjoy benefits of a company issued device that allows them to do more both in the cockpit and on the ground.

Jeppesen Flight Deck Pro

The Windows ecosystem also has a long history of aviation-focused programs, like Jeppesen's Flight Deck Pro. Originally launched for Windows back in 2009, FliteDeck Pro has become an industry standard application for interactive chart rendering. The latest release, FliteDeck Pro V8.0 for Windows 8.1 further enhances the pilot's experience with the capability to view charts and manuals side by side and the ability to add handwritten notes while working in a chart. When used on the 12" form factor of the Surface Pro 3, FliteDeck Pro display a readable rendering of an entire instrument approach procedure chart on one side of the screen with the ability to display another app, such as weather, on the other.

In addition to running aviation applications, Surface Pro 3 can obviously run any standard Windows-based productivity app. That means when they aren't flying, pilots can use the device as their standard notebook for doing e-mail, expenses, Word documents, custom company applications and more. As a result, they don't need to carry a notebook in addition to their tablet, ensuring that the weight of their electronic flight bag remains low.

IT MANAGEABILITY

Another key benefit of being a full Windows PC is that airlines IT departments can manage the device just as they do any other PC. A company's existing Windows-compatible solutions can be easily extended to manage Surface Pro 3. These tools can be used to physically manage the hardware, to deploy software updates, install new applications or application updates, refresh the BIOS and more. Identity management and security tools used by businesses for their Windows PCs can also be used with the Surface, reducing the risk of potential hidden costs that can occur with other devices.

IT can also use the same policies for managing data across Surface Pro 3 and their other Windows-based devices, allowing them to keep the Total Cost of Ownership (TCO) for the devices in line with other PCs.

As a professional Windows-based PC, Surface Pro 3 also features a TPM (Trusted Platform Module) which can be used in conjunction with the BitLocker features of Windows 8 Professional to ensure that all data on the device is both encrypted and secure. Given the high theft rates for mobile devices, this capability can bring additional piece of mind for airline IT departments. In addition, the manageability features of a Windows-based device like the Surface Pro 3 allow airline IT to have a "kill switch" capability in the event that a device is lost or stolen so that no critical data is lost.

CHALLENGES

No IT solution is perfect for all environments and so too with Surface Pro 3. Some organizations have no experience with Windows 8 and the Surface Pro 3's inability to be downgraded to Windows 7 could be seen as a concern by some airlines. However, the Windows 8-based Surface Pro 3's can easily coexist with Windows 7-based PCs around the organization and most IT management tools can handle mixed environments with absolutely no issues. Plus, Windows 7 applications will run on Surface Pro 3 running Windows 8, so there's no need to invest in porting applications to other platforms.

In addition, some organizations may prefer to stick with lower-cost tablet solutions. However, by the time you match the 128 GB storage capacity of the Surface Pro 3 the cost of alternative solutions get very close. Plus, they don't offer the multitasking abilities, extended functionality and enhanced management capability of the Surface Pro 3.

CONCLUSIONS

Airlines are in the midst of an important transition as they move all their pilots over to EFB solutions. Given all the benefits that EFBs offer versus traditional methods—including dynamically updated data and greatly reduced carrying weight—there's no question that it's the right thing to do. The only question is which solution to use. While there are several popular options available, pilots and IT personnel need to look long and hard at the overall requirements of their application and ensure that they choose a solution that can best meet all of those requirements - for both the pilot and the IT manager. Only then can they be assured of something that both groups can be happy using for a long time to come.

In addition to basic issues like screen size, visibility, ergonomics, connectivity, software support and manageability, companies also need to think about the overall strategy of potential partners. How are potential partners positioning themselves to stay relevant in a world that's increasingly moving to mobility and to the cloud?

Finding companies that have successfully partnered with major airlines—as Microsoft has with Delta, Lufthansa and Austrian Airlines—is also important. The real-world lessons learned from logging millions of hours on thousands of flights on thousands of planes ensures not only a solid solution now, but the ability to create solutions that will continue to be useful and relevant in the future.

Businesses are changing, devices are changing and the nature of aviation is changing. Products like the Surface Pro 3, backed by the vision and capabilities of Microsoft, can serve as an

important enabling element to ensure that pilots have the best possible information at their fingertips as they navigate the skies above.