Aviation Maintenance

The Monthly Management Tool

September 2003

Perceptive CEO
Ray Andrick

Hand(held)s Across the Hangar

Lady Grace's Splendid Spitfire

The Solution to Aviation's Big Problem

U.K. Maintenance: Down, Not Out

PBI MEDIA

Computers on the Shop Floor

By James Careless, Contributing Editor
Photos by Paul Brou

Portable and handheld computers are changing the way MROs are doing business, for the better. In fact, as the following MRO case studies show, portable/handheld computers are improving productivity and cutting aircraft maintenance costs in a big way.

Lockheed Martin: cutting processing time in half

Headquartered in Greenville, South Carolina, Lockheed Martin Aircraft and Logistics Centers (LMALC) is a huge military maintenance, repair, and overhaul facility. The company typically identifies and repairs 40,000 to 50,000 non-routine discrepancies a year at its Greenville Aircraft Center, servicing P-3s, C-130s, and C-9s.

Unfortunately, "our paper-based processing system typically took five days from first assessment to placing the maintenance order," said Lee Withington, LMALC's director of quality. "It started with the inspector walking around the aircraft and noting discrepancies. Each time he found one, he put a red dot beside it, then wrote it down on his pad." From here, the inspector walked back to his office and filled out up to 100 different fields on paper forms, which were then taken to another desk for data entry. This data was then entered into LMALC's SAP enterprise management system, in order to requisition the right parts, people, and repair facilities.

"At this point, our government clients would look over our reports," Withington continued. "Typically, they would decide not to act on 18 percent of them. This means that all the time and expense in writing them was lost; we couldn't bill them back."

In an effort to cut costs without compromising service, LMALC mapped out its processes "step by painful step," Withington said. The goal was to eliminate wasted effort. After shopping around, LMALC decided that off-the-shelf MRO software made by Perceptive Solutions was suited to the task. Known as "Handheld NRC 2.0," Perceptive's software product is designed to run on a range of portable/handheld wireless computers. It provides MRO inspectors with forms designed to capture, record, and then relay non-routine discrepancy data. The beauty of Handheld NRC is that it writes the necessary reports as the data is collected: when the inspector has finished entering data, the report is ready for wireless filing to the MRO's server or back-office computer system.

To run the system, LMALC opted for Symbol Technologies's PPT-2846 Portable Pen Terminals. Based on the Microsoft Pocket PC platform, the PPT-2846 boasts large color touchscreen displays, bar code scanning, and wireless connectivity.

"We chose the PPT-2846 after talking with Goodrich, which has had good experiences with this device," said Kevin Hutchens, Lockheed Martin's QC supervisor. "It is a stylus-controlled handheld that can call up detailed graphics of the aircraft. To log a discrepancy, you drill down to the right location on screen, tap it, and the location is recorded. This data is then sent by Wi-Fi [wireless] connection to our server, for immediate entry into SAP." The PPT-2846s can also access technical manuals from LMALC's servers, giving technicians the details they need right on the shop floor.

"Thanks to the PPT-2846s, we have cut processing time in half from 5 days to just 2.5 days, Withington said. "As well, as soon as we find a discrepancy, it goes immediately to a web page accessed by our clients. They can then decide whether to act on it or not. We don't do anything further unless they agree, which saves us a lot of money."

Perceptive, Inc. president Ray Andrick showing the company's software in action.

"The switch to the Perceptive Solutions/Symbol Technologies approach paid for itself within four months," Hutcheson said. "Today, it continues to save us money, while allowing us to serve our customers faster."

Lufthansa Technik: laptops help mobile repair teams solve problems quickly

Keep 'em flying: that's the philosophy of Lufthansa Technik. This is why the German MRO has developed an innovative mobile maintenance solution: one that minimizes downtime for Lufthansa's 140 short-range aircraft.

Here's how it works: at Lufthansa's hub in Frankfurt, Germany–site of 250 daily Lufthansa departures and arrivals–Lufthansa Technik maintains a fleet of specially-equipped service cars and vans. Each carries a two-person crew, at least one of whom is a category B-qualified technician. Also on board are tools, troubleshooting equipment, traceable consumables, a two-way radio, and a wireless-equipped laptop with a 40-gigabyte hard drive. The hard drive contains technical manuals for the Lufthansa fleet dating back to 1987. As well, the laptop can connect into Lufthansa Technik's local-area network to access further technical materials, requisition parts and services, and to communicate via e-mail to other Lufthansa Technik technicians.

Whenever a problem is reported by an incoming Lufthansa aircraft, a Lufthansa Technik mobile unit is radio-dispatched to the arrival gate. While this is taking place, the discrepancy report is logged directly and wirelessly by the local-area network onto the mobile team's laptop. "Typically, the non-routine discrepancy report comes to us while the aircraft is still enroute," said Alexander Stern, Lufthansa Technik's manager of line maintenance. "In fact, 60 percent of the reports we deal with are automatically generated by the aircraft's ACARS [on-board air-to-ground communications] system." The result: by the time the Lufthansa Technik crew drives up to the aircraft, they have information about what's apparently wrong and the necessary technical documentation to investigate it immediately. They can even undock the laptop from the vehicle and take it into the cockpit to cross-reference readings there with Lufthansa Technik's online databases.

While the team works on the aircraft, two dispatchers in Lufthansa Technik's Frankfurt control center keep an eye on the service fleet's overall activities. "Each car is equipped to advise us of its status: available, not available, received an order, order in process, and fixed an order," Stern said. "This ensures that we're on top of our on-ramp maintenance requirements at all times."

To say the least, Lufthansa Technik's wireless-equipped laptops are central to its fast response maintenance teams in Frankfurt. And make no mistake, this approach works. In fact, 90 percent of all service calls received by the Lufthansa Technik teams are responded to within 10 minutes or less. This means that aircraft spend less time delayed at the terminal, keeping schedules tighter and passengers happier.

"We've found that using wireless-equipped laptops improves our response times, minimizes aircraft delays, and reduces our overall costs," Stern said. "For Lufthansa Technik, adopting portable computers has been a real plus."

BAE SYSTEMS: EDNA simplifies and speeds up F-16 servicing

As a military MRO, BAE Systems's Fort Worth Operations Center specializes in servicing F-16 Falcons. Until the company devised its own laptop-based Portable Maintenance Aid (PMA), updating the F-16's onboard computers required some serious heavy-lifting.

"The F-16 was supported by a large pallet of equipment," explained Brad Draper, site manager for BAE Systems's Fort Worth, Texas facility. "To update its computer systems, you'd have to wheel this pallet in place and connect it to the aircraft."

Hence the genesis of EDNA. Short for Enhanced Diagnostics Aid, the EDNA PMA replaces the F-16 equipment pallet with a laptop-based Electronics Unit (EU) and an Aircraft Specific Application Set (AASS). The AASS is a package of interface/adapter cables and diagnostic software tailored to the F-16.

"We took a rugged off-the-shelf laptop and modified it to replace the pallet," said Pat Jacobs, BAE Systems's program manager for aircraft support systems. "This approach has made updating F-16's flight systems

much faster, quicker, and safer for our maintenance personnel," he added.

Here's how the EDNA PMA system works. The EU ruggedized laptop connects directly to the F-16, using cables from the Aircraft Specific Application Set. The technician uses the laptop to pull data from the F-16's own systems and to record discrepancies. They can also call up technical information, analyze information downloaded from the F-16, and begin software uploads from the laptop.

EDNA's capabilities are impressive. For diagnostics, the EDNA can test the F-16's fire control radar, displays, flight controls, engine, mission computer, electronic warfare, and pods, among others. Meanwhile, the EDNA PMA's memory load/verify functionality eliminates the need for multiple input sources. From one laptop, BAE Systems technicians can update all the aspects listed under diagnostics, plus the F-16's HARM ALIC, Comm/Nav/ID, and GPS, and they can do these changes on the fly. For instance, an F-16 can return from a bombing mission and during restocking, the F-16's onboard systems can be configured for interception duties.

If these benefits aren't enough, consider the EDNA PMA has resulted in a 250-percent improvement in load/verify time over the previous F-16 pallet-based system. In 95 percent of all cases, the EDNA is able to diagnose onboard problems in 20 minutes or less. Meanwhile, use of this system has resulted in a 700-percent reduced mobility footprint for BAE Systems-serviced F-16s.

Lockheed Martin Aircraft and Logistics Centers inspector Andrew Webb uses Perceptive's software running on a Symbol Technologies wireless Portable Pen Terminal at the point of inspection.

The bottom line: EDNA has paid off for BAE Systems and its customers. This is why BAE Systems is now using EDNA to service F-117s and B-2s as well, and has deployed 300 EDNA PMAs worldwide.

Cessna's laptops support the Citation X

The Citation X is Cessna's signature business jet. This is why the aircraft maker created Team X, a 24/7 service team dedicated to supporting the Citation X. "We have one toll-free hotline for Citation X customers, and our team deals exclusively with this aircraft," said Team X supervisor Steve Lill.

Of course, dedicated service teams alone don't guarantee fast, effective service. This is why every new Citation X is delivered with an IBM laptop computer and a Data Monitor Unit (DMU). There are 34 electronic logic modules within the Citation X performing a wide variety of functions, Lill explained. The laptop's main function is to interface with the DMU to perform a diagnostic analysis on these modules. It records their inputs and outputs in real time so that technicians looking for problems can analyze this data.

Should a problem arise, the IBM laptop can be connected to the relevant aircraft system through a DMU. The system is then operated while the technicians monitor its actions using the diagnostic software installed in the laptop computer. The laptop allows operators to view this data in real time in flight or to record it for viewing on the ground.

The IBM laptop also lets the user e-mail this data to Team X for additional support. "Let's say a problem occurs that doesn't require immediate downtime for a revenue-producing carrier, but needs attention," Lill said. "Once the data has been downloaded into the laptop, it can then be e-mailed to Cessna's Team X while the aircraft remains in service. While it's on the job, we can be analyzing the logic module readings. The result: in many cases we can decide what needs to be done and have a team ready to fix the problem at the next scheduled maintenance stop. This keeps the Citation X properly maintained, while minimizing disruption to its owners." AM

Portable Computing Makes A Difference

Here's a summary of the benefits companies like Lufthansa Technik, Lockheed Martin, BAE Systems, and Cessna are enjoying from the use of portable computers in the maintenance of their products.

First, using laptop/handheld computers allows MROs to retrieve on-aircraft data quicker and more accurately. Add a wireless link, and these devices can relay this information directly into an MRO's central database. The result: no more miscommunications between departments, delays between recording and filing service reports, and time wasted due to writing and then inputting paperwork into other systems.

Second, shop-based computers provide a fast, reliable route for assigning tasks to crews either in the shop or on the ramp. Lufthansa Technik has taken this benefit to the level of art by combining it with mobile repair vehicles.

Third, laptops and handhelds eliminate the need to haul service manuals around the floor. They also make it easy to lookup service information: either from the device's own storage medium or from the company mainframe via wireless networking.

Fourth, laptops and handhelds save money for those who use them, as Lockheed Martin, Lufthansa Technik, and Cessna can attest. For these companies, portable computing technology has truly changed the way MROs do business, and definitely for the better.

Contact

Perceptive Solutions, Inc.
6525 The Corners Pkwy., Suite 405
Norcoss, GA 30092
Phone: 770-409-7676
www.perceptive-inc.com