Dream introduction

Getting the 787 Dreamliner ready for airline service begins long before delivery **by Jay Spenser and photos by Bob Ferguson**

With flight testing of the Boeing 787 under way, Boeing employees are focused on its progress toward certification and delivery in the fourth quarter of this year.

But introducing an all-new jetliner into commercial operation involves much more than just delivering a great airplane. Successful debuts also require that the airlines be fully ready to operate the new airplane, and that they have available to them a full spectrum of customer services and support. These three elements—airplane, airline and support—together create service readiness.

"When we deliver a new commercial airplane, we in effect place the Boeing brand in our customers' hands and they entrust us with their brand," said Mike Fleming, 787 director of Services and Support. "For this to all go well, a great deal has to happen behind the scenes. The preparation begins long before the first airplane is delivered, and we work hand in hand with our airline customers throughout the process."

ANA (All Nippon Airways of Japan) is the launch customer for the 787, with 55 on order for domestic and international routes. "We worked very closely with Boeing throughout the 787's development and are pleased with the results," said Michihide Kono, ANA vice president of Engineering and Maintenance. "In addition to being more comfortable, fuel-efficient, better for the environment and easier to maintain, the 787 brings e-enabled maintenance capabilities that reduce the time [the airplane] will spend on the ground between flights. This is a really important advantage in our domestic operations."

To introduce a new airplane into its fleet, an airline must address training, information, tools, spare parts and infrastructure issues such as ground-support equipment and airplane compatibility with airport gates. Airlines look to Boeing for comprehensive support that will help them have a successful entry into service. Once revenue operations begin, they depend on Boeing support to help keep their airplanes flying without disruption.

"Expectations were high for Boeing's previous all-new airplane, the 777, which quickly established itself as the most reliable twin-aisle jet in the world," said Larry Slate, who is leading the entry-into-service process for the 787. He is a former United Airlines executive who was the airline's 777 fleet manager when it introduced the airplane in 1995. "Today the bar is set even higher with the 787," Slate said. "Although the Dreamliner represents a quantum leap in technology, we're working to ensure that it attains a consistently high level of reliability even faster than the 777. For this to happen, we need to have a more mature airplane and more mature product support before service entry."

Commercial Aviation Services is providing an unprecedented level of support to the test program. This effort includes the Boeing field service engineers who will soon be based with 787 operators around the globe, as well as key suppliers to the 787 program who are participating at Boeing's request.

"This flight-test involvement helps us better understand the expected reliability of the 787's systems and components, most of which are monitored by the airplane and are designed to last longer than those of previous airplanes," according to

PHOTOS: Supporting 787 flight test, manufacturing and maintenance in Seattle and Everett, Wash., are: **(main photo)** Mark Baird and **(insets, from top)** Adrian Butler, Kishor Joshi (left) with Cam Le, and Paul Patterson.

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– Susan Linde, Material Management leader for 787, Commercial Aviation Services

Dale Wilkinson, vice president of Material Management, Commercial Aviation Services. "And once the 787 enters service, its operators will count on us and our suppliers to anticipate and develop rapid short-term solutions and implement final fixes to eliminate any issues that might crop up."

Airlines typically want their spare parts on hand two months before receiving the airplane. But they need to order this inventory six months before then. And before the airlines place their order, they must first decide which and how many spare parts to procure. They also may need approval for this expenditure from their board of directors, which can take time. So Boeing must provide the right information for informed spares-provisioning decisions as much as one year before entry into service.

A very large number of Commercial Airplanes and other Boeing employees directly or indirectly support the 787 entry-into-service process. "Introducing the 787 is an exciting challenge," said Jeff Haber, 787 Maintenance Training manager, Training and Flight Services, Commercial Aviation Services. "From its composite structure and more electric architecture to its extensive use of information technology, this airplane presents a great deal that's new on the hardware and software fronts. We're working closely with our customers to help ensure they're ready."

Boeing delivers Dreamliner maintenance training through the Maintenance Performance Toolbox, an integrated suite of software applications and tools that provides users with airplane maintenance data in advanced formats. Although the Toolbox is an existing Commercial Aviation Services product offering, the 787 is the first Boeing airplane to use it as its single source of both maintenance data and maintenance training.

"The decision was made at the outset of the 787 program to provide technical information in an entirely new and better way," said Freelon Hunter, director of Maintenance Information Systems. "Toolbox is a key component of this decision, which exploits the 787's unique capabilities as the world's first e-Enabled jetliner."

With delivery of the first ANA 787 scheduled for later this year, training has already begun for 450 ANA maintenance technicians around the world. Before Boeing could develop comprehensive training, however, a wealth of airplane data needed to be completed and manuals and illustrations created. Boeing employees also developed, among other things, training for 787 flight and cabin crews, laid out the regulatory basis for the operational certifications that airlines must secure from their regulatory authorities, and prepared the minimum-equipment list that carriers and authorities will use to define airplane-related dispatch criteria. It's all part of the entry-into-service process.

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PHOTOS: (Right) Helping prepare the 787 for a smooth entry into service is Kelly Haggin. **(Inset)** A 787 is shown in the Everett, Wash., factory.

The e-Enabled advantage

Electronic links between the 787 and airline operator streamline maintenance and data collection

Starting with the 787, information technology is joining maintenance and engineering on the front lines of airplane readiness.

Or as Bob Manelski, director of Crew Information Services, Commercial Aviation Services, explains it: "The e-Enabled 787 provides a direct electronic link to airline offices. Whereas other airplanes operate in relative isolation, the 787 is integrated into airline ground networks."

What e-Enabling does is streamline airplane maintenance. For example, airlines can load software upgrades wirelessly rather than having technicians perform this task manually on the plane. For operators with large fleets, this will save significant time, effort and expense.

Another advantage e-Enabling provides is access during flight to the 787's Electronic Logbook, an onboard system that automatically records any maintenance issue that arises. As a result, technicians can be standing by with the correct spare parts and tools when the 787 arrives at an airport gate.

A key e-Enabling tool is the Maintenance Laptop, which revolutionizes 787 line maintenance. Applications on this laptop allow fault isolation, software management, data downloading and many other tasks to be performed. These laptops can also host the Maintenance Performance Toolbox, a Boeing software suite providing complete maintenance guidance for the 787 airplane.

When working in and around the airplane, airline technicians can connect their Maintenance Laptops to a Dreamliner by any of three wired Ethernet connections or a wireless interface. More than one laptop can be used at the same time. All the links are protected with security measures, including encryption and passwords.

– Jay Spenser