Boeing 717: Designed for Airline Profitability

Development Strategy Focused on Maintenance and Reliability

Today's airline companies have a better chance of staying in business and making money if the cost of maintaining their fleets of airplanes is kept low and daily dispatch reliability from the airport gate remains high. And both of these two keys to financial success depend a lot on how the airplanes are designed in the first place.

All businesses have direct operating costs. In the case of airlines, they include what carriers pay for owning their airplanes, fueling them, employing flight and cabin crews, and other necessary expenditures to continue carrying passengers.

A big part of these costs go for maintenance. In fact, the world's airlines spend more than $40 billion annually on their airplanes, with the typical airline spending as much as 20 percent of its costs for keeping airplanes ready to depart on time.

"Maintenance costs are those needed to restore or maintain an airplane's systems, components and structures in an airworthy condition," said Jim Phillips, vice president of the Boeing 717 jetliner program, which is located at the company's final assembly plant in Long Beach, Calif.

Boeing engineers set a goal of low maintenance costs and reliable dispatch performance for the 717-200 when they started the design process for the 100-passenger jetliner. Airlines told Boeing that maintenance and on-time departures were key factors for their bottom line. Today, 717 operators credit the airplane for a big part of their financial success.

In developing the 717, now in regular passenger service around the world, Phillips said the company focused on the relationship between maintenance and reliability.

"Our design team had several goals, such as reducing the number of parts, minimizing downtime and improving access for mechanics, he said.

Steps Taken During Design

To make sure it stayed focused, Phillips said, the team carried out certain steps during design. First, they reviewed dispatch records for Douglas-designed twinjets, looking closely at the MD-80 fleet of more than 1,100 airplanes in service. Using this data, the team worked to boost 717 reliability to 99.1 percent and cut maintenance cost by 20 percent.

Next, the team set up airline advisory groups to improve the flight deck, cabin interior and systems. Many proposals reduced maintenance and increased reliability. Two of the groups also worked with Rolls-Royce to improve the engine.

Third, a chief mechanic was assigned to the 717-design team as an airline advocate to ensure that all decisions considered real-world conditions.

Focus on Targets PaidOff

The fourth step looked at the causes of non-routine maintenance on previous twinjets. For the MD-80, the team found that delays at the airport gate were attributed to nearly 1,700 airplane components. Of these, only about 100 caused half of all departure delays, making improvement of these components a high priority.

At the same time, the team successfully retained designs on other twinjets, including the airplane's simple and reliable primary flight controls.

Systems throughout the 717 were redesigned to simplify components and to speed up maintenance. For example, 717 environmental controls now have 27 percent fewer line replaceable units than the DC-9 and MD-80. The electrical system was streamlined from 60 to only nine major components, eliminating 150 wires, and the landing gear's steel brakes were attached with pins instead of fasteners, cutting installation time by 60 percent.

Rolls-Royce produced a 717 powerplant that is relatively easy to maintain. The engine resists damage from foreign objects; it allows mechanics to stand on lowered cowlings to perform work using standard hand tools; and the lengthy interval between replacement of life-limited parts lowers material costs.

Supporting the Customer

Boeing Field Service representatives help airlines introduce their new 717s into service. They also advise carriers on how to maintain and operate the airplane, use technical publications, purchase parts and receive training. And they work with customers on technical problems, design changes, warranties and incidents.

The business-to-business web portal MyBoeingFleet.com offers operators access to Boeing technical information and services. Airlines use the portal to store and retrieve data from their maintenance, engineering and operations departments.

Operators of the 717 receive engineering, program and quality assurance support. They also can get help in repairing, overhauling and exchanging airplane components.

The 717 Performs

So, how well is the 717 performing in daily revenue service?

"Our operators tell us the airplane is meeting and even exceeding expectations," Phillips said.

According to fleet dispatch statistics reported to Boeing, the 717 is beating the design target of 99.1 percent for on-time departures. Several operators have achieved more than 99.5 percent. In fact, the 717 has achieved a monthly average of 99-plus percent dispatch reliability faster than any competing airplane, demonstrating that it provides dependable operation for airlines and their passengers.

The 717's excellent "out of the gate" reliability is even more impressive in light of demanding short-haul service common to 717 operators. One customer, Hawaiian Airlines, operates a fleet of 13 airplanes on an inter-island network of very short-range routes with an average of 14 flights a day per aircraft.

"The 717's dispatch reliability in such challenging environments is no surprise," said Tom Croslin, chief project engineer, "because the airplane was specifically designed for intensive, high frequency regional operations."

There's also good news on 717 maintenance, with data from operators showing much lower costs compared with the DC-9. For instance, AirTran Airways reports that it's doing better than Boeing expectations. Out-of-service time for its 717s is 80 percent less than for DC-9s. The airline's extensive maintenance inspections, such as C-checks, are averaging three days for the 717 and 21 days for the DC-9.

The U.S. Federal Aviation Administration has extended AirTran's interval maintenance checks, based on its good in-service experience with the 717. The time between C-checks increased to 4,500 hours or 18 months.

AirTran reports that the 717 saves labor hours compared with the DC-9. It also finds that C-check costs for the 717 are 10 percent of those for the DC-9. Hawaiian has found that the 717 allows it to lower costs by taking advantage of the airplane's digital technology to know how each system and component is performing to anticipate problems before they happen.

Other 717 operators, such as Aerolineas Baleares, Bangkok Airways, Olympic Aviation, and QantasLink, also have reported similar cost savings and reliability benefits, thereby increasing their financial success in the 100-seat market.

The newest 717 customer, Midwest Express Airlines, purchased the airplane because it "uses advanced technology, resulting in improved dispatch reliability and significantly lower operating costs than our current fleet in terms of fuel efficiency and maintenance," said Timothy Hoeksema, chairman and chief executive officer.

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For further information:
Warren Lamb
717 Communications
562-593-3269
warren.g.lamb@boeing.com