



# Point-to-Point®

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## Airplane Product Strategy During a Time of Market Transition

By Jeff VerWey, Director, Integrated Product Strategy, Boeing Commercial Airplanes

*Ed. Note: As the evolving economic crisis continues to narrow our attention with every new development, Point to Point invites you to expand your line of sight once more to the 20-year horizon that airlines, airplane manufacturers and financiers need to keep in their sights.*

An uncertain marketplace and concern about fuel prices have created real tension in our industry. It's difficult for airplane customers to look beyond immediate business imperatives. But when they do, understandably, they ask us to focus on product improvements that will improve operating efficiency and alleviate their costs.

At Boeing, we're constantly looking at a broad range of possible new airplane solutions and airplane product upgrades that will do just that. The goal is to identify opportunities for innovation and technology that will help our customers thrive – both in the near-term market and the market that will emerge from the current economic turmoil.

### 787 Dreamliner technology leads the way

With the 787 Dreamliner getting ready for first flight, we're leveraging the highly successful technologies developed for that airplane by incorporating them in upgrades to our current product line and, ultimately, into new airplane designs.



Cabin advances – Dimmable windows and LED lighting are among technology breakthroughs incorporated into the new 787.

Leadership in the innovative application of technology is directly responsible for the phenomenal success of the 787 in the marketplace. Sustaining that leadership is the constant theme of our development activities, whether in applications for composites and other advanced materials, propulsion, aerodynamics or onboard systems. The 787

demonstrates the key is to integrate across many technologies in order to simultaneously bring innovation in efficiency, capability and passenger experience to the marketplace.

Of course we closely monitor engine developments for advances in fuel use, noise and emissions. Each of the engine manufacturers is blazing its own trail toward the efficiency and environmental performance that the next generation of airplanes will need.

Pratt & Whitney got off to an early start with its geared turbofan technology. They have already flown a prototype geared turbofan engine on their own flying testbed and on an Airbus A340-600. Their results show significant progress.

CFM International—a partnership between GE and Snecma—and Rolls-Royce are also making headway. CFM is pacing development of its LEAP-X engine to be ready around 2016. Rolls-Royce is developing an advanced turbofan engine architecture and seriously studying open rotor engines, which may offer even greater potential for fuel efficiency.

### Integration is key

Future opportunities for improvement come from a wide diversity of technology advances. The challenge is to choose the right suite of technologies that will provide value and advantage in a constantly evolving market environment.

After fuel efficiency, maintenance costs are the area where we can make the most difference in helping our customers save money. New materials, robust systems, and airplane health management technologies are helping us break new ground in maintenance cost reduction and airplane availability.

We also look at ways to reduce other operating costs, such as crew-related costs, airport and navigation fees, and servicing the airplane between flights. For example, common flight deck displays and training can make it easier for flight crews to gain certification to fly multiple airplane models. New on-board systems help reduce the number of manuals pilots must carry and improve the communication between pilots and airline operations centers to enhance planning and improve schedule reliability.



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Environmental considerations, extremely important in their own right, increasingly figure into operating cost calculations. Whenever we can reduce aircraft noise or emissions, we are also helping customers manage costs, as well as helping the environment.

### Improving the passenger experience

Of course, passengers are expecting innovations to the cabin interior—seats, overhead bins, lighting, lavatories, galleys, in-flight entertainment—the whole passenger experience. Our ConceptCenter is the lab where many of those innovations are born and developed.

It's a hands-on environment where we can work with customers to address airplane cabin issues that airlines and passengers will be dealing with in the near-, mid-, and long-term.

For example, about eight years ago, we began working on cabin



*Interior View* – D-shaped windows, new overhead design and a floor display (foreground) for viewing the terrain below are features of a next-generation airplane cabin mockup at Boeing's ConceptCenter in Everett, Washington.

architectures that would allow airlines to convert cabins from one configuration to another quickly and efficiently, so the seating mix could be optimized for actual demand in varying economic and market conditions. At the same time, we addressed the balance between standardized and customized airplane interior features. Today, these and other projects from those studies define the state of the art aboard the 787 Dreamliner.

Taking on some of the industry's most difficult challenges—window size, cabin pressure, interior humidity—the ConceptCenter came back with airplane interior solutions unlike anything that had flown before. ConceptCenter research is the foundation for the creative solutions that find their way onto our airplanes—as passengers will appreciate when 787 Dreamliners begin pulling up to boarding gates.

### Envisioning the next airplane products

About four years ago, we launched an intensive effort to determine what it would take to replace the 737 Next Generation. It was a pretty humbling experience.

It reminded us just how good the 737 is. Any thought that we could simply scale down 787 technologies and create a single-aisle

airplane with 10- to 20-percent lower operating costs than the 737 was dashed pretty quickly. It will require the next generation of technology in a number of areas to make significant operating cost improvements a reality.

While the application of composite materials on the 787 is revolutionary for a commercial jet transport, future generations of lightweight materials will bring even greater improvements to aircraft design, durability and performance.

After 50 years of development you would think that the current state of the art in aerodynamics is pretty advanced, but further refinements in high speed efficiency are on the horizon.

Some believe blended wing-body airplanes, which seem to captivate the imagination of many industry observers, are the answer. We've taken a serious look at these over the years, but challenges of cabin pressurization and passenger ride quality, among others, have steered us in other directions. Although these concerns are not showstoppers, blended wing-body designs would have to deliver compelling advantages to justify their jetliner development.

Systems architecture took great strides when we went to more electric systems and eliminated pneumatics aboard the 787. Further potential for reducing weight and power consumption, and lowering maintenance costs could be coaxed from this area. We have just scratched the surface of airframe and engine health management and maintenance prognostics.

The challenge is to develop these and other technologies and then integrate them to bring value to the industry stakeholders that depend on the success of a strong, resilient air transportation industry.

### Environmentally progressive aviation

Concern for the environment is becoming more important for passengers as well as airplane operators. Our work to develop alternative aircraft fuels is a good example of thinking outside the airplane to respond to customer needs.

It's very exciting. In one year, with the help of industry partners, we have gone from demonstrating a proof-of-concept biofuel to multiple demonstration flight tests using biofuels produced from various sustainable plant feed stocks.

Biofuels produce very low CO2 emissions over their production and use cycle, and they perform as well as petroleum-based jet fuel. We're helping develop fuel specifications to accelerate industry-wide acceptance of these fuels. Our next task is to help manufacturers understand the requirements for producing commercial quantities of aviation biofuel for widespread use.

### In summary

We're confident that our airplane products are well-positioned for today's market. We have a sizeable production backlog and our fleet is performing well in service.

Clearly, our current focus is on execution of our current airplane programs. Yet, the portfolio of potential technologies and products we are studying is the broadest it has ever been. The challenges are huge. But keeping customer needs, the evolving marketplace, and the industry's long-term prospects foremost in our thinking has been a successful strategy for Boeing—and we're certain that it will guide us to develop the industry-leading products that our customers have come to expect from us. ■

## 737 Next Gen gets boost from new interior, performance enhancements

The current thinking by airframe manufacturers is that replacements for today's single-aisle best sellers like the 737 are likely at least a decade away. That belief prompted Boeing to recently announce several cabin and performance enhancements aimed at keeping its Next Generation line fresh and focused on delivering customer value.

It unveiled a new 737 Boeing Sky interior, based on advances developed for the new 787 Dreamliner, as well as operational improvements to structure and engines that will improve the NG's fuel efficiency.

The Sky Interior features new, 787-style modern sculpted sidewalls and window reveals that draw passenger' eyes to the airplane's windows, better connecting them to the flying experience. The design offers larger, pivoting overhead storage bins that add to cabin openness, and redesigned reading-light switches and integrated PA-system speakers to improve the passenger experience among other features.

The 737 improvements are more than cosmetic. Boeing is targeting a two percent reduction in fuel consumption by 2011 through a combination of airframe and engine improvements. Moves such as reshaping structural elements and re-contouring the engine nozzle will reduce drag, improving fuel efficiency by about one percent. CFM, which supplies the NG's CFM56-7 engines, will contribute another one percent cent through hardware change to the power plant. Together, these will reduce the airplane's fuel use by two percent, representing up to \$160,000 in operating costs per airplane annually. ■



*Sky Interior is 787 inspired* – Announced in late April, the new Boeing Sky Interior for the next-Generation 737 draws on the company's extensive 787 passenger experience research to create a more appealing, and quiet, in-flight environment. Seven carriers, including Continental, have signed up to receive updated interiors starting in late 2010.

## Production rates perspective

By Bill Collins

*Ed. Note: Bill Collins and his team mesh customer sales requirements with manufacturing capabilities to create Boeing's long-term airplane production schedule, better know as the "skyline."*

In the current economic downturn, we manufacturers are getting plenty of production rate advice. It typically goes like this: "Boeing and Airbus need to cut production by (fill in percentage) or risk building "white tail" airplanes."

Regardless of who's offering advice, it's important to remember that it reflects a perspective shaped by, among other things, self interest. We all have considerations that drive our decision making. So, here's our perspective.

Production rate changes, as our CEO Jim McNerney said recently, are a big business decision. The market is certainly a concern. But we also consider obligations to customers, impacts to suppliers and implications for employees and stockholders, among other factors. This includes what our production team calls making a "controlled descent," where we move downward without crashing our supply chain partners while preserving options to move up again without scrambling when things improve.

For example, in considering wide body rates, we look at demand. It has softened, particularly for freighters. We also look at order times for things like engines and seats, both of which are long-lead items. Total time to turn out a widebody can be two years or more because of the lead time required for such items. Consequently, we are conservative when committing to higher production rates, and that makes us less flexible. Thus, when we do have to reduce rates, it is not a drastic reduction. In the end, we decided to reduce 777 rates in June 2010, and hold off on modest increases to 747-8 and 767 production.

On the other hand, for standard bodies, implementation times are shorter – on the order of a year. Given the greater production flexibility, we were more aggressive in committing to rapid production of 737 Next Generation airplanes. Despite our aggressive rates, we still have some oversold positions next year and beyond, which has offset impacts from the limited deferrals that we've seen. For that reason, we have not needed to change current 737 rates and will continue to monitor conditions should future adjustment be required.

Fortunately, we've only had a small number of order cancellations (58) this year and have been more active in working with customers on deferrals from 2010 to 2011 and beyond. This activity has allowed us to significantly recovery production lost during the machinists' strike last fall. Our remaining commercial backlog of \$266 billion gives us even more flexibility than in the past to move customers forward when others ask to defer.

The scope and impact of production decisions are significant and need to be made deliberately. If we need to adjust, as we did after post 9/11, we will do so, and we'll do so as efficiently as possible. In the meantime, we'll be watching today's very dynamic and fluid situation very closely. ■



Bill Collins, Director Sales and Marketing Operations Boeing Commercial Airplanes

# Noteworthy Developments

## 787: Moving ever closer to first flight

At press time, Boeing's 787 Dreamliner program continues to tick off key milestones on the way to first flight. In early May, the first Dreamliner moved to the flight line in Everett, Wash., to begin fuel testing. It will undergo additional airplane power and systems checks including engine run-up tests, which began May 21. After completing final systems checks and high-speed taxi tests, the airplane will be ready for first flight, which is on schedule for later this quarter.

"We are making great progress, and moving ever-closer to first flight," said Scott Fancher, 787 vice president and general manager. The 787 Dreamliner has orders for 886 airplanes from 57 customers.



*First Dreamliner in fueling* – Dreamliner number one (designated ZA001) awaits fueling tests at dock on Everett, Wash. flight line.



*Engine runs begin* – The 787's first engine runs marked the first all-electric start of a commercial jetliner engine onboard a twin-aisle commercial jetliner.

## Mexicana signs up for 25 717s

Mexicana Group's Click subsidiary has begun operating the first few of an eventual 25 717-200s to be leased from Boeing Capital under a long-term deal announced in March. Mexicana is also receiving training support and spares provisioning under a comprehensive Boeing solution. "The 717 offers a wealth of value – greater fuel efficiency, lower maintenance costs, a modern flight deck and spacious interior," said Tim Myers, BCC vice president for structured financing. The 717s will replace the carrier's current fleet of Fokker F-100s.



*Mexicana clicks with the 717* – The twinjet is seen here in the livery of the airline's Click subsidiary. The new regional carrier is the first North American 717 operator outside the U.S.

## Boeing hosts annual Middle East conference

Boeing Capital's fourth annual airline planning conference for Middle East and European bankers and investors was held in Cairo in late April. Despite it being a difficult time for the commercial aircraft financing market, this year's event continued to increasingly draw senior-level financiers. "Our objective was to share information and perspectives on market conditions that are unique to us, and only available as a result of our objective role as a manufacturer and not as a competing bank or financial institution," said John Matthews, BCC's managing director for Middle East and Africa.

*Cairo conference class* – Approximately 30 high-level attendees from 17 institutions attended BCC's 2009 Middle East and European regional airline planning conference. The event's popularity reflects the region's growing importance on the international aircraft financing scene.



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