



# Frontiers

[www.boeing.com/frontiers](http://www.boeing.com/frontiers)

SEPTEMBER 2009 / Volume VIII, Issue V

## Space for growth

The arrival of Boeing's newest satellite  
is opening doors to opportunities  
in the commercial market





**TOGETHER  
WE FLY HIGHER.**

When you call a plane a Dreamliner, you're setting your sights high. The new 787's development has only been possible thanks to Boeing's UK partnerships. Here, we've developed engines, simulators, flight deck seats, landing gear, and ways to reduce cabin noise. And learnt the higher we aim, the higher we fly together. Discover more at [boeing.co.uk](http://boeing.co.uk)



*"Angel of the North" is the first of a series of ads created to reinforce Boeing's many partnerships with the United Kingdom. Boeing is the largest overseas customer of the UK aerospace industry and currently partners with more than 250 businesses and universities around the country. The ad will begin running this month in The Sunday Times, The Economist UK, and House Magazine, as well as four other UK publications.*

## On the Cover

# 14

## New bird

Nearly one-third of the approximately 300 commercial satellites in orbit today were built by Boeing at its million-square-foot satellite factory in El Segundo, Calif. The latest model, known as the Boeing 702B, opens the door to many opportunities in the commercial market, where customers are looking for adaptable, medium-power satellites. Four years in development, the 702B from Boeing Space and Intelligence Systems made its debut in July.

**COVER IMAGE: MIKE CONNELLY, BOEING INTELSAT PROGRAM DIRECTOR OF DIVISION OPERATIONS (LEFT), AND MIKE NEUMAN, 702B PROGRAM DIRECTOR, LEAD SPACE AND INTELLIGENCE SYSTEMS' 702B SATELLITE PROGRAM, DANA REIMER/BOEING AND BOB FERGUSON/BOEING**

**PHOTO: SPACECRAFT TECHNICIAN PAUL IM OF BOEING'S EL SEGUNDO, CALIF., SATELLITE FACTORY, ASSEMBLES A BATTERY PANEL USED ON THE 702B. BOB FERGUSON/BOEING**



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# Table of contents



## Super trip in 82 days

Earlier this year, a Boeing-led team that included two Super Hornets circled the globe, stopping in a number of countries to perform at air shows and display the jet fighters. It's part of a strategy by Integrated Defense Systems to boost international sales.

PHOTO: KEVIN FLYNN/BOEING



## Rewriting the rules of mobility

The Bell Boeing V-22 Osprey, with its unique tilt-rotor design and performance, is flying a variety of missions for the U.S. military, from assault support transport for the Marine Corps to inserting and extracting special operations forces with the Air Force. PHOTO: U.S. AIR FORCE



## Tanker talk

Rick Lemaster, KC-X program manager, tells *Frontiers* how Boeing is preparing for the upcoming KC-X tanker competition, including listening closely to the customer and incorporating lessons learned from the last round. Depending on U.S. Air Force requirements, Boeing is ready to offer either its 767 or the bigger 777 platform.

PHOTO: RICHARD RAU/BOEING

## INSIDE

**06** Leadership Message  
**07** Snapshot/Quotables

**08** Historical Perspective  
**10** New and Notable

# New editor to lead *Frontiers*



Taking the controls as *Frontiers* editor this month is James Wallace. One of the world's leading aerospace journalists, Wallace joins *Frontiers* following 12 years covering the aerospace beat for Seattle's *Post-Intelligencer* newspaper and Web site. During that time he covered Boeing, Airbus, the airlines and the aerospace industry and reported on key issues, trends and events, developing a worldwide readership. He succeeds Junu Kim, who earlier this year took a new role supporting communications for Boeing's Engineering, Operations & Technology organization.

PHOTO BY BOB FERGUSON/BOEING



## Earthrise

The Obama administration soon will lay out NASA's direction in human spaceflight, possibly setting a course back to the moon or even to Mars. Whatever the journey, Boeing will be there as a leader, just as it was in the heady days of the Mercury, Gemini and Apollo programs when mankind took its first steps beyond Earth.

PHOTO: NASA



## A planet-sized opportunity

Employees throughout Boeing are using the power of Lean+ to drive efficiency—and help protect the environment and create a safer workplace. The initiative even has been extended to Boeing's global suppliers.

PHOTO: PAUL PINNER/BOEING



## Aircraft finance, explained

A brief course conducted by Boeing Capital Corp. is helping employees across Boeing achieve a better understanding of a critical customer process—the financing of multimillion-dollar jetliners. They find it's not unlike what's involved in getting a home mortgage. PHOTO: MARIAN LOCKHART/BOEING

**54** Stock Charts  
**55** Milestones

**58** Around Boeing

# Investing in the future

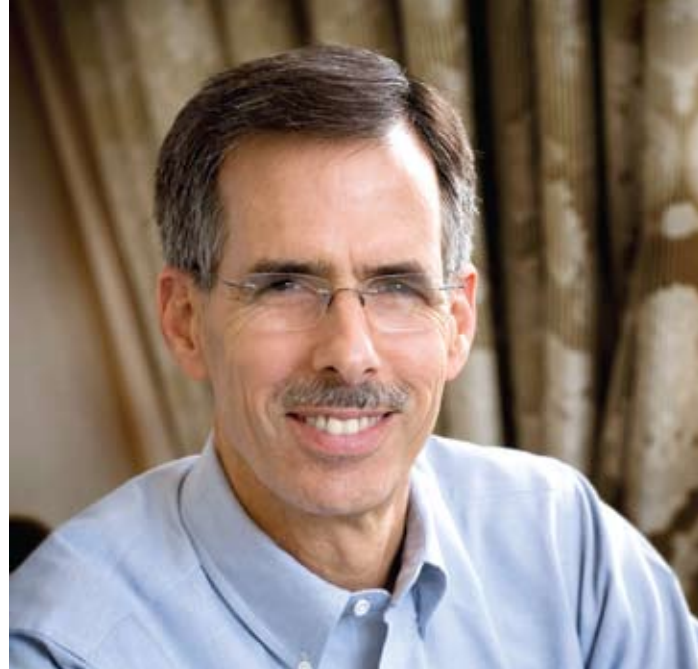
Boeing continues to innovate the technology that defines aerospace

*John Tracy*

*Chief technology officer, Boeing*

*Senior vice president, Engineering, Operations & Technology*

PHOTO: BOB FERGUSON/BOEING



**T**oday, when Boeing is so strongly focused on meeting the near-term challenges of the economy, our customers and our development programs, it's not always easy to look far ahead.

But to ensure the long-range competitive success of our company, we must—and do—look ahead at the various scenarios that might unfold for our customers five, 10 or even 20 years down the road to determine what innovative technologies we need to invest in now to meet their evolving needs.

This is why we continue to read in *Frontiers*, Boeing News Now and elsewhere about our efforts to develop exciting new concepts for highly efficient, ultra-low emissions transport aircraft, autonomous unmanned vehicles, advanced satellite systems, hypersonic vehicles, networked systems and more.

In addition to protecting our future, we also need our technology investments to provide the maximum yield. This is why we have an integrated Enterprise Technology Strategy team that not only evaluates the long-term (as well as short- and mid-term) needs of the business units but also determines which technologies will meet those needs and whether we should develop them in-house or acquire them elsewhere.

Through this approach we have identified eight technology domains that we think are critical to our future success. Within these domains, engineers from Integrated Defense Systems, Commercial Airplanes and Boeing Research & Technology work on technology projects that benefit both our commercial and defense businesses, and that might also open new business opportunities for Boeing. These collaborative teams also ensure that technology gaps and duplication are avoided and that replication is maximized.

As a result, our current integrated technology plan reflects more than \$200 million in company investments that benefit multiple programs and fills gaps identified in such areas as rapid prototyping and open-fan engine technology.

Additional savings are being achieved through such replication opportunities as applying robotic drilling technology developed by BR&T for the 787 program to the F/A-18E/F, employing non-destructive composite evaluation techniques on the 787 program that were developed with company funds by IDS, and leveraging Commercial Airplanes' development work in alternative fuel

technology for potential U.S. Department of Defense solutions.

And even further benefits are being realized through greater company-funded collaboration among Commercial Airplanes, IDS and BR&T in the development of more innovative and affordable technologies in areas such as composites, network systems, integrated health management, and modeling, simulation and analysis.

In fact, this integrated enterprise approach is reinforced by how Engineering, Operations & Technology's new, centrally managed BR&T organization has been chartered to focus as much on providing mid- to long-range technologies that benefit the enterprise as on near-term solutions. It does this not only by conducting its own research and development but also by searching the world for the most innovative, cost-effective technology solutions possible. Last year, for instance, BR&T opened a new research and technology center in Australia and another in India, adding to the Boeing R&T centers already established in Europe and Russia.

As we continue to tackle our near-term challenges, we also continue to plan for how we will continue to define the future of aerospace in the same innovative ways we have over the past nine decades, during which our employees developed and produced such industry firsts as: all-metal airplanes; retractable landing gear and controllable trim tabs; pressurized cabins and high-altitude commercial airplanes; the flying boom and aerial tankers; tandem rotor helicopters and manned hypersonic aircraft; geosynchronous communications satellites; and spacecraft that put man on the moon.

Yes, Boeing employees have done amazing, sometimes seemingly impossible things, and continue to do so. Furthermore, they manage to do all these amazing things even during times of significant global and economic challenge.

So I'm confident we will succeed with our current challenges, too, and I'm excited about what lies ahead. There will certainly be more challenges for us and our customers, and many of them will require the kind of innovative and affordable technology solutions that have made Boeing employees famous. That's why we continue to plan ahead and position Boeing for future success. ■



## GOING LONG

At 250 feet 2 inches (76.3 meters) in length, Boeing's new 747-8 Freighter will be the longest commercial jet airplane when it enters service, scheduled for late next year. It moved closer to first flight last month as mechanics began the "power on" process—a complex series of tasks that energize and activate the airplane's electrical and other systems. **GAIL HANUSA/BOEING**

## Quotables

**“We think [Airborne Laser] will be a game-changer for weapon systems the same way stealth technology transformed aerial combat.”**

– Michael Rinn, Boeing vice president and Airborne Laser program director, following the successful in-flight test firing of the high-energy laser on board the Boeing Airborne Laser aircraft, also called “first light in flight,” as reported in *Defense Daily* on Aug. 21

**“The airplane is alive.”**

– Joe Guerrero, a team leader in 747 Systems, referring to the 747-8 Freighter's achieving electrical “power on,” which allows the program to begin testing the airplane's electrical as well as hydraulic and pneumatic systems, as reported in *Randy's Journal* blog on Aug. 17

**“We're encouraged that our view of the combined manufacturers' gap is trending below the \$5 billion mark, and it likely will be well under that by year-end.”**

– Walt Skowronski, Boeing Capital Corp. president, referring to how Boeing's midyear data dispute earlier industry estimates of financing that will have to be provided by all commercial airplane manufacturers for 2009 deliveries

## IAM PROMOTIONS

No promotions listed for periods ending July 31 and Aug. 7, 14 and 21.

## ETHICS QUESTIONS?

You can reach the Office of Ethics & Business Conduct at 1-888-970-7171; Fax: 1-888-970-5330; Web site: <http://ethics.whq.boeing.com>

# Emerging stronger

Lessons from leaders past offer insight into today's business challenges

By Mike Lombardi

**N**early every day, stories in the media describe the challenges facing the aviation business in these times of economic turmoil. Yet throughout history, the industry and The Boeing Company in particular have withstood such crises to emerge stronger than ever.

One example is the downturn from the late 1960s through the 1970s, which saw mergers and cutbacks across the aerospace industry. By drawing on the vision, innovation and pioneering spirit that the company was built on, Boeing came through that crisis stronger—and with two new commercial airplanes: the 757 and 767.

Though the 1970s were difficult, they didn't match the turmoil of the Great Depression, which began in 1929 and continued to World War II.

As the Depression hit, William Boeing's vision of the airplane for business and commerce was being realized. Boeing had built an aviation infrastructure that tied together airplane and engine manufacturers with airfields and airlines to create an efficient, profitable system of airmail and passenger travel that spanned the United States.

That infrastructure was a product of the United Aircraft and Transport Corp. (UATC), which Boeing formed in 1929 with his friend Fred Renschler, then head of Pratt & Whitney. As an aviation holding company, UATC brought together airplane manufacturers Boeing Aircraft, Hamilton Metalplane, Sikorsky, Chance Vought, Northrop and Stearman; engine-maker Pratt & Whitney; propeller manufacturer Standard Steel; and airlines Boeing Air Transport, Pacific Air Transport, Stout Airlines, National Air Transport and Varney Airlines.

Not only was UATC successful during the Depression, but the aviation industry continued to grow. That attracted the attention of U.S. President Franklin D. Roosevelt's administration as it swept into office in 1933. U.S. Sen. Hugo Black, D-Ala., launched an investigation of the industry, alleging the major aviation holding companies had colluded with the former postmaster general over the distribution of airmail routes to their airlines. This meeting on route awards was dubbed the "Spoils Conference."

Many industry notables were compelled to testify before the commission, including William Boeing, who was grilled



by Sen. Black for nearly six hours.

In February 1934, based on the commission's initial findings, Roosevelt ordered the cancellation of all airmail contracts and authorized the U.S. War Department to assist the postmaster general in delivering mail by air until a new Air Mail Act was finalized.

Taking airmail away from the airlines and relegating it to the Air Corps proved disastrous. Only half the routes were covered, and worse, in those five months there were 66 accidents, with 12 fatalities.

This ended in June 1934 with the Air Mail Act. The legislation dissolved the holding companies and forbade any executives who had participated in the Spoils Conference from holding airmail contracts.

William Boeing had anticipated the decision and already had initiated the breakup of UATC, rather than wait for the government to intervene. The breakup saw the creation of three major companies: The airline business continues today as United Airlines and Pratt & Whitney, Chance Vought, Sikorsky





“Throughout history, the industry and The Boeing Company in particular have withstood such crises to emerge stronger than ever.”

**PHOTO:** One of the famous airports built by William Boeing’s United Aircraft and Transport Corp. was the Burbank Airport in Burbank, Calif. It is shown here in November 1934 surrounded by Boeing Model 247s operated by United Air Lines. **BOEING ARCHIVES**



and Hamilton Standard became United Aircraft Corp., now known as United Technologies Corp.

Stearman Aircraft joined with Boeing Aircraft and Boeing Aircraft of Canada under a new entity, the Boeing Airplane Company—which continues today as The Boeing Company.

For William Boeing, this ordeal outraged his sense of justice and personal honor. For years he had lost money growing his business from a boathouse to a national corporation, and just when he had found success, he became a “suspect.”

In September 1934, Boeing decided it was time to resign as chairman of UATC, sell all his stock and retire from the industry he had pioneered. Before he did, though, he wanted to ensure that The Boeing Company was prepared for the future and handed over company leadership to one of his hand-picked engineers, Claire Egtvedt.

Egtvedt went on to define Boeing’s future as he pursued its new strategy—building the “big Boeings.” In June 1934, Boeing engineer Ed Wells had begun preliminary design on the

Model 299, later known as the B-17 Flying Fortress. The Flying Fortress became an icon of American air power during World War II and with it Boeing became a household name. In the 75 years since, Boeing has been the premier builder of large airplanes, a legacy that continues today with the 747-8 and 787 Dreamliner.

In 1941, the U.S. Court of Claims ruled that there had been no fraud or collusion in the awarding of airmail contracts. Boeing and the other pioneers of commercial aviation were vindicated of any wrongdoing. ■

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**PHOTOS: (LEFT)** William Boeing. **(ABOVE)** The company’s strategy to build “big Boeings” following the breakup of United Aircraft and Transport Corp. resulted in planes like the B-17 Flying Fortress, which made Boeing a household name. **BOEING ARCHIVES**

# First C-17 delivery builds ties with Qatar

Aircraft to fly humanitarian airlift missions

By Lorenzo Cortes

**Q**atar Airways has been a solid customer for Boeing Commercial Airplanes and is acquiring 777 and 787-series aircraft. Now, Qatar, a small country located on a peninsula in the southwest Arabian Gulf, is becoming an important market for Integrated Defense Systems as well. Key opportunities there include fixed-wing aircraft, training solutions and industrial partnerships, according to IDS Middle East Business Development director Jeff Johnson.

To better participate in humanitarian lift operations around the world, the Qatari government signed a contract last summer to acquire C-17 transport aircraft, the first of which Boeing delivered last month at its C-17 production facility in Long Beach, Calif.

A longtime customer of European defense providers, Qatar only recently has emerged as a potential market for U.S. companies like Boeing.

“Qatar’s acquisition of C-17 military transport aircraft marked the first time the country opted for U.S. defense equipment of

any kind,” Johnson said. “The trust and good will we have established as a result of the C-17 acquisition will be crucial as we pursue other business and partnerships in Qatar.”

“In the Middle East, our customers view Boeing as one company, not just as IDS or Commercial Airplanes,” Johnson said. “It is important to understand that when the Qataris approach us, they make no distinctions. That the Qataris rely on Boeing to provide airborne humanitarian lift capability and commercial airliners is a testament to the effort Boeing has made in gaining the trust of this customer.”

Along with other Arabian Gulf states—Saudi Arabia, the United Arab Emirates and Kuwait—Qatar is experiencing a period of strong economic growth. Qatar has the world’s second-highest per-capita gross domestic product. A major oil and natural gas exporter, Qatar in recent years has developed its economic status to become a global player in the financial sector. ■

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“The trust and good will we have established as a result of the C-17 acquisition will be crucial as we pursue other business and partnerships in Qatar.”

– Jeff Johnson, IDS Middle East Business Development director



**PHOTO:** Qatar’s first C-17 takes off for its new home after delivery last month from Boeing’s Long Beach, Calif., factory. MICHAEL GAIL/BOEING

# Poseidon

## Navy's new warrior

**B**oeing officially “rolled out” the U.S. Navy’s new P-8A Poseidon aircraft during a July ceremony in Renton, Wash. Close to 500 people gathered for the event at the Lake Washington manufacturing facility.

Navy sailors in attendance were all smiles upon seeing the Poseidon up close and painted in Navy gray for the first time. Many came from Naval Air Station Whidbey Island, Wash., where P-8As will eventually be based.

During his speech, Adm. Gary Roughead, chief of Naval Operations, thanked the men and women at Boeing and the industry team.

“You are building this airplane magnificently ... you are building it for the sons and daughters of America who will fly it, man it and operate it for decades to come,” Roughead said.

Washington State Gov. Christine Gregoire proclaimed July 30 as P-8A Poseidon Day and asked the people of Washington and the nation to join her in the celebration.

“The P-8A Poseidon will equip the U.S. Navy with the most advanced multi-mission maritime patrol and reconnaissance



aircraft in the world,” said Jim Albaugh, Boeing Integrated Defense Systems president and CEO.

Attendees also included representatives from Boeing’s industry partners and suppliers, elected officials, and Boeing employees.

Boeing’s industry team is currently preparing for the start of formal flight testing, which will begin in Puget Sound in the coming months. The Navy plans to purchase 117 P-8As to replace its fleet of P-3C aircraft.

– Charles Ramey

**PHOTO:** Surrounded by a sea of admirers, the U.S. Navy’s P-8A Poseidon formally rolled out in July at Boeing’s Renton, Wash., plant. **JIM ANDERSON/BOEING**

# Bio-thunder

## on the water

**W**ith Seattle’s 60th anniversary Seafair celebration as a backdrop, Boeing—a main sponsor of the event—used the U-787 hydroplane Aug. 1–2 to showcase the company’s involvement in the community while helping pioneer a new generation of sustainable biofuels for commercial aviation.

Driven by hydroplane hall-of-fame driver Chip Hanauer, and powered by the same biofuel blend demonstrated earlier this year aboard a Japan Airlines 747-300, the U-787 made history on Lake Washington with an exhibition that culminated in a final run using a 100 percent biofuel blend of camelina, algae and jatropha. It was a first for an unlimited hydroplane.

“A sport like hydro racing provides a great way to bring attention to the good work and promise offered by sustainable biofuel technology,” Hanauer said. “I think it’s great that Boeing is using a racing venue to demonstrate to our culture that biofuel development is all about performance. Performance, innovation and sustainability—a great combination!”

Boeing is working with science, fuel and technology leaders to accelerate the market availability of bio-based fuels



that can help aviation lessen its environmental impacts. This comprehensive research and test program, conducted over the past several years, will help support approval of these fuels for use in commercial jetliners.

– Terrance Scott

**PHOTO:** The Boeing U-787 unlimited hydroplane thunders down the straightaway of the Lake Washington racecourse in Seattle in early August. The series of demonstration laps highlighted the viability of sustainable aviation biofuels in a high-performance engine. **ED CLARK**

# Boeing on health care



An efficient, high-quality and well-managed U.S. health care system is essential for employees and the nation

By Karen Fincutter

**B**oeing and its U.S. employees have a significant stake in the current national health care debate. The company provides high-quality health care coverage and insurance-related benefits to more than 500,000 employees, retirees and dependents in 48 states, spending around \$2 billion annually. Here, *Frontiers* highlights what's important to Boeing in keeping high-quality health care available—and affordable—for employees, their families and all Americans.

## What is important to Boeing?

- **Health plans should encourage individual responsibility and accountability through wellness and preventive care.** Boeing provides high-quality health care and wellness programs for its employees. “We believe that preventive care is the key to reducing overall cost because our data tell us that nearly 40 percent of what Boeing spends is for conditions frequently linked to preventable health risks,” said Rick Stephens, Boeing senior vice president of Human Resources and Administration. To support employees’ healthy lifestyles, Boeing offers a robust wellness program.
- **Employer-based health care coverage should be preserved.** “A comprehensive health care program for employees and their families is a strong competitive advantage for any company—and one in which Boeing takes great pride,” Stephens said. “It helps us get and keep top-performing employees and we believe it results in a healthier work force.” Boeing teams up with health care providers to offer benefits that provide comprehensive coverage at a low cost to employees.
- **Cost and provider quality for consumers should be transparent.** Increasing the availability of information about how health care measures up can help consumers find the best physicians and specialists. Transparency should include quality and cost information. “Appliances, cars and movies get rated by experts, but how does the care that your doctor provides rate against peer performance?” Stephens said. “Even when the health plan is picking up most of the cost, we should know how much it will be upfront instead of being surprised when the bill comes in the mail.”
- **National legislation should be clear and comprehensive.** Determining one national policy that clearly states roles and responsibilities is important to Boeing and other large employers. Boeing operates in 48 states and following different plans for each one would be unwieldy. An example of a law that provides the desired sort of legal certainty is ERISA, the

Employee Retirement Income Security Act, which covers employer-established health and pension plans. Boeing favors an incentive-based tax structure that would help manage costs and design programs to meet the needs of its work force. And, Boeing does not support taxing benefits.

- **Affordable health care should be available to all by improving our health care system’s focus on quality and efficiency.** Technology improvements would modernize the U.S. health care system and take advantage of all of the benefits of computerized data collection—all while getting closer to creating a mistake-proof system and driving down costs. Boeing supports payment reform to reward providers based on outcomes reached through evidence-based medicine, not the number of services. Boeing also advocates access to affordable health insurance for all those who are uninsured and underinsured through employers, the private market, or current government programs such as Medicare, Medicaid or SCHIP, the State Children’s Health Insurance Program. ■

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**PHOTO:** Alversia Martin of Maxim Health Services checks the blood pressure of Rick Stephens, Boeing senior vice president of Human Resources and Administration, during a health screening.

DAVID MARTIN/BOEING



# Benefit from your benefits



Many Well Being tools and resources are available to help employees make healthful choices:

## **BoeingWellness Web site**

With content provided by the world-renowned Mayo Clinic, [www.BoeingWellness.com](http://www.BoeingWellness.com) delivers reliable information and innovative online tools to help you manage your health and well-being. Employees and eligible family members can access the site free of charge—24 hours a day, seven days a week. Participant use of the site is confidential and protected by Mayo Clinic.

## **BoeingWellness Health Letter**

As a complement to the Web-based information resources from Mayo Clinic, the BoeingWellness Health Letter is mailed to employees' homes each month.

## **Care and disease management**

Most of Boeing's health plans offer care management programs, which provide personalized education and support for people with chronic conditions.

## **Employee Assistance Program**

The EAP is a confidential service that connects Boeing employees and their families with experienced counseling professionals for help with personal issues. Call 866-719-5788, 24 hours a day. International employees can call Canada collect at +1-905-270-7658. Or visit <http://eap.web.boeing.com>.

## **Exercise opportunities**

Many Boeing facilities have on-site fitness centers for employees to use. In some parts of the United States, families of Boeing employees can save up to 65 percent when they join a fitness club through GlobalFit, a company that negotiates discounted prices with commercial health clubs. Visit [www.BoeingWellness.com](http://www.BoeingWellness.com) and select the "Physical Activity" link for more information about available resources.

## **Family Care Resources**

Family Care Resources provides free, confidential referral services for Boeing employees and retirees, helping them find a variety of services to make life more manageable. The services are for family members residing in the United States. Just call 800-985-6895; international employees can call the Boeing operator and ask to be connected to the 800 number. Or visit Boeing Family Care Resources online at <http://familycare.web.boeing.com>.

## **Financial Planning seminars**

Two seminars, "PlanWell" and "RetireWell," are taking place at many U.S. sites and online via the Boeing Education Network, or BEN, this year. The seminars are similar in content but geared to different audiences depending on how close employees are to retirement.

## **Free & Clear Quit For Life® program**

This free and confidential program features telephonic sessions with professional Quit Coaches®, nicotine replacement therapy products and Weight Calls to help manage weight while quitting. For more information, visit [www.BoeingWellness.com](http://www.BoeingWellness.com) and select the "Quit Tobacco" link, or call 866-784-8454.

## **Flu Prevention program**

Boeing's free flu shot program is available to employees each fall at company sites across North America.

## **Health Risk Assessment**

The Mayo Clinic Health Risk Assessment is an interactive tool offered on [www.BoeingWellness.com](http://www.BoeingWellness.com). Employees receive a personalized health report, and healthy lifestyle coaching is available.

## **Pay & Benefits Profile**

Available through Boeing TotalAccess, the profile provides a personalized snapshot of your total pay and benefits package and other sources of income available to you during retirement—as well as tools to help you estimate your future income needs.

## **Preventive care**

Employees and dependents covered by a Boeing medical plan may be eligible to receive preventive care exams—often at low or no cost.

## **Retirement Income Calculator**

The Boeing Savings Plans Web site offers plan savings and retirement planning calculators that provide estimates tailored to an employee's personal situation.

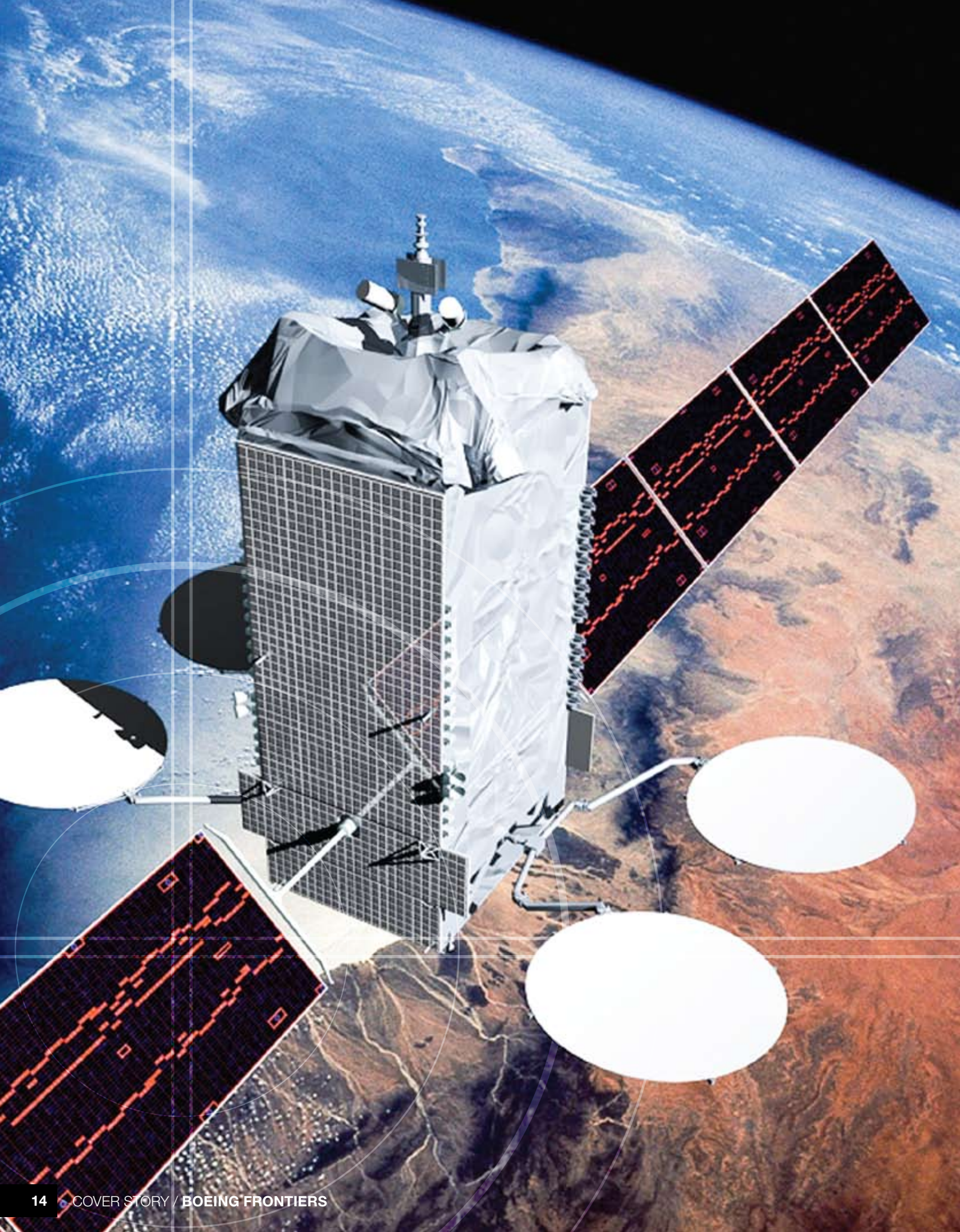
## **Stress Management Web site**

All stress-related resources offered by Boeing can be found in one convenient place at [www.boeing.com/stressmanagement](http://www.boeing.com/stressmanagement). The Boeing Stress Management program offers professional, confidential counseling services, one-on-one stress management coaching, qualified referrals for stress-busting services, and classes and seminars.

## **Weight management tools**

A variety of weight management tools are available to Boeing employees and their family members. Visit [www.BoeingWellness.com](http://www.BoeingWellness.com) and select the "Weight Management" link on the home page.





# MAGIC BUS

702B aims for midsized satellite market with proven systems, adaptability

All stories by Dave Garlick

**“We are not launching an entirely new bus. We’re using flight-proven 702 technologies including flight software, avionics and the power management system.”**

– Craig Cooning, Boeing vice president and general manager, Space and Intelligence Systems

**GRAPHIC:** The Boeing 702B targets the mainstream commercial satellite market with an affordable, scalable design. The propulsion tanks, for example, are available in six different sizes. JIM SANTONI/BOEING

There are a few things that happen just once a decade: the U.S. census, the Great Lakes freezing over, the New York Mets going to the post-season—and Boeing Space and Intelligence Systems unveiling a new satellite model. In July, after four years of development, S&IS rolled out its 702B satellite. “I’ve been at Boeing for 36 years, and I’ve seen a new product line maybe three times,” said Mike Neuman, 702B program director. In fact, the 702B debuted nearly 10 years after its older sibling, the larger, high-power 702, first launched in 1999.

Until July, S&IS’ satellite strategy was to sell high-power 702s for large, complex programs such as DIRECTV, Wideband Global SATCOM (or WGS) and SkyTerra. The 702B concept grew from a satellite market study Boeing commissioned in 2004 showing a coming boom in medium-sized, medium-power satellites. Dozens of satellites built during the satellite heyday in the 1990s, many of them Boeing 601 models, were coming to the end of their useful lives and needed replacing.

Enter the Boeing 702B, designed to give satellite operators in the government and commercial worlds what they want most—choices. “We took the results of that market study and did an exhaustive study on future government requirements and used the composite of both to derive a set of requirements that drove the 702B design,” said Andy Kopito, who led the 702B internal research and development design team. It may look new on the outside, but those familiar with a satellite’s inner workings will recognize it as more evolution than revolution. “That’s the key thing, we are not launching an entirely new bus,” said Craig Cooning, S&IS vice president and general manager. “We’re using flight-proven 702 technologies including flight software, avionics and the power management system.”

The bus, which is the part of the satellite dedicated to navigation and propulsion, can be scaled up or down on the 702B according to what the customer needs. The satellite works in the medium-power range, 6 to 12 kilowatts—a measure of how much power the satellite can provide to its customers and their communications needs. For example, 12 kilowatts is equal to a very big light fixture holding 30 rows with 40 standard 100-watt light bulbs in each row. The biggest 702B can generate enough solar power to light all 1,200 bulbs. That’s a lot of juice in a small package.

In a key sale, Intelsat and Boeing inked a deal in July for four 702Bs. “We were looking for a multi-satellite buy to introduce 702B,” said Steve O’Neill, S&IS’ vice president of commercial and civil programs. “Intelsat was the right customer at the right time.” Intelsat Senior Vice President Ken Lee said his company based its choice on the 702’s heritage. “We have done a lot of technical due diligence to make sure this spacecraft will have the highest reliability. All of the flight avionics have been flying for many years on the 702 platform.”

Lee explained the 702B offers concepts and designs that match his company’s changing requirements. As Intelsat diversifies its fleet, the satellite can accommodate different power needs and a wide variety of payloads. “It works out very nicely for us, and in the final analysis, we felt it is a very good value,” added Lee.

S&IS is making an all-out effort to make 702B a success. “702B is our future and we have to get it right,” O’Neill recently told his team.

That commitment shows up not only in the painstaking design and development of the spacecraft, Neuman said, but also in its people. S&IS staffed the program with some of its best, seasoned veterans. “Everyone on the 702B team has an average of a quarter-century of satellite experience,” he said. “I really want to see Boeing become the leader in the commercial business again. This is personal for me because it is a very significant part of my life.”

The first 702B is scheduled to launch in March 2012. ■

dave.garlick@boeing.com

# BETTER BY DESIGN

Leveraging teamwork and technology to produce satellites faster, for less

**T**he Boeing 702B satellite is designed to be manufactured. That sounds obvious, but you'd be surprised how many things these days aren't. As they created the 702B, Boeing engineers were thinking ahead about how to assemble and test it, and they designed features to make production faster. They were also thinking of the end-users: "We spent a lot of time talking to our government and commercial customers about their requirements and what they'd like to see in the Boeing 702B," said Andy Kopito, who led the 702B internal research and development design team. "We used that input to drive a lot of our design decisions."

This philosophy they adopted is called Design For Manufacturing And Test (DFMAT). "Planning how we are going to efficiently assemble the structure and propulsion systems and then test them was paramount in our minds because we wanted to make the 702B go through the factory faster and cheaper," said James G. Wilson III, 702B internal research and development project manager.

How did they do it? Teamwork and technology: 702B design engineers teamed with technicians, floor supervisors, production control specialists and nearly everyone else involved in building a spacecraft; engineers and technicians examined the 702B from all angles to find the quickest and most effective way to build and test it. "We let the production folks have a look at early designs," Wilson said. "We learned what things they liked and didn't like about previous designs and what, ultimately, they'd like to see for producibility in our new designs."

The 702B was designed using powerful Delmia computer-aided design programs that didn't exist a decade ago when Boeing's last major satellite, the 702, first appeared. Wilson said the teams first built the spacecraft virtually, using a number of Delmia simulations. "We actually put Delmia 'virtual people' into assembly simulations and watched them work, to see if their wrists had to turn in awkward ways, for example."

The team applied the Lean and DFMAT concepts of avoiding bottlenecks in the production process wherever possible. The bottom line for any spacecraft design is fitting it into the fairing on top of the rocket. Naturally, design engineers try to compress all of the antennas and other components into small areas. But as Wilson points out, "At the end of the day, people have to go in and turn screws, so we needed to make sure we weren't doing gymnastics to try and put the parts together."

The first 702B satellite is under construction and will take about a year and a half to build and test. The goal for the second spacecraft is to complete it 20 to 40 percent quicker, taking just about a year, then to continue speeding up the process for the third and fourth satellites. Wilson said he's inspired by the work of the engineers who preceded him on the venerable Boeing 601 and 702 spacecraft. "I have a great deal of respect for those that came before me. Our advantage is, we can take it a step further with the simulations we can run today." ■



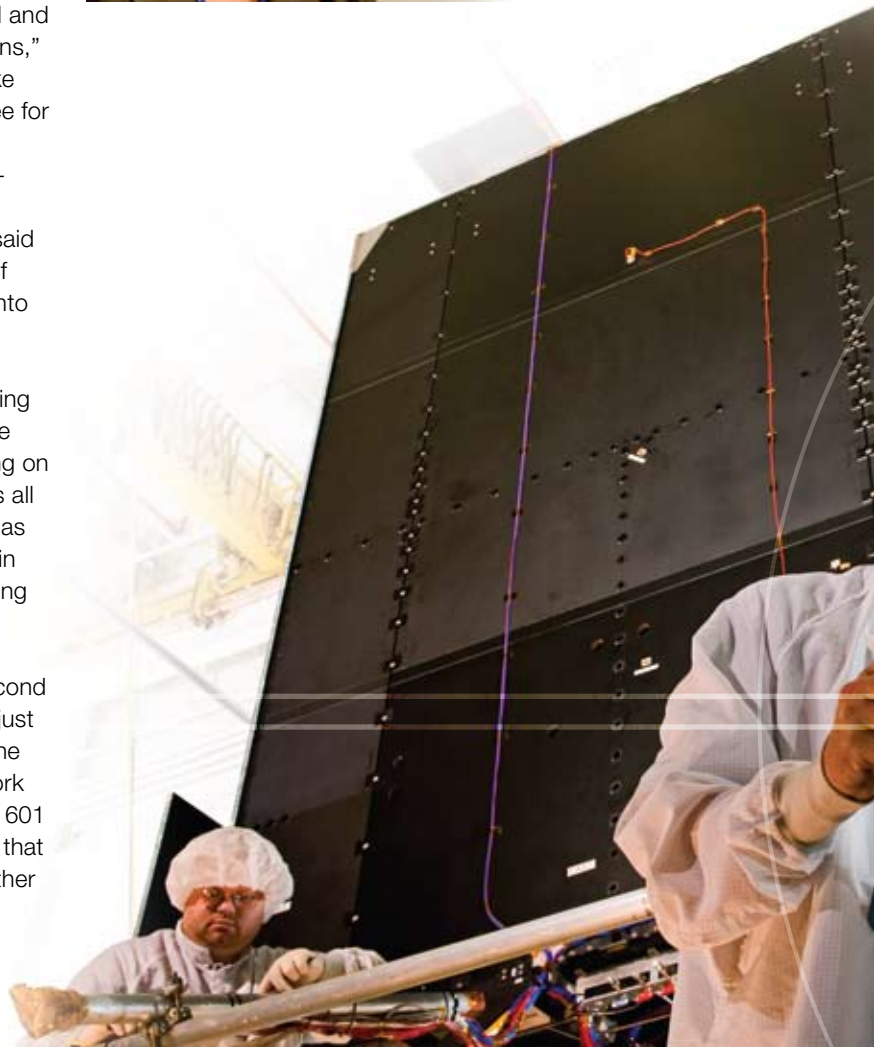
"I feel the 702B project was right in the 'wheelhouse' of my experience and capabilities, requiring me to apply nearly everything I'd learned in my career."

– Andy Mactavish,  
702B chief propulsion engineer



"We built an online collaborative, communicative project management environment that reduced the amount of time and resources needed."

– Janie Warren,  
702B/Intelsat project manager





# A GOOD HOST

## 702B can mix commercial and government payloads

“The scalable 702B architecture is designed to cover a wide range of capabilities ... If we did our job properly, this will be a very successful product line.”

– Jim Smolko, 702B propulsion product team leader



“I had to make some sacrifices like working weekends and not spending as much time with my family... I wanted to see us get back to building 10–12 spacecraft a year.”

– George Voulelikas, 702B system architect and chief engineer



**PHOTO: (BELOW)** Space simulation test senior technicians Todd Powell (background), Ken O’Connell (left) and George Brandos install and test accelerometers on the 702B to measure vibration.

ALL PHOTOS BY BOB FERGUSON/BOEING AND DANA REIMER/BOEING



The first Boeing 702B satellite to roll off the line for Intelsat will carry a Boeing-built Ultra High Frequency (UHF) hosted payload for the Australian Defence Force. A hosted payload is government-owned and -operated hardware riding on a commercial satellite. It is a way to get space-based capability launched sooner and at a lower cost than larger, more expensive government satellite programs.

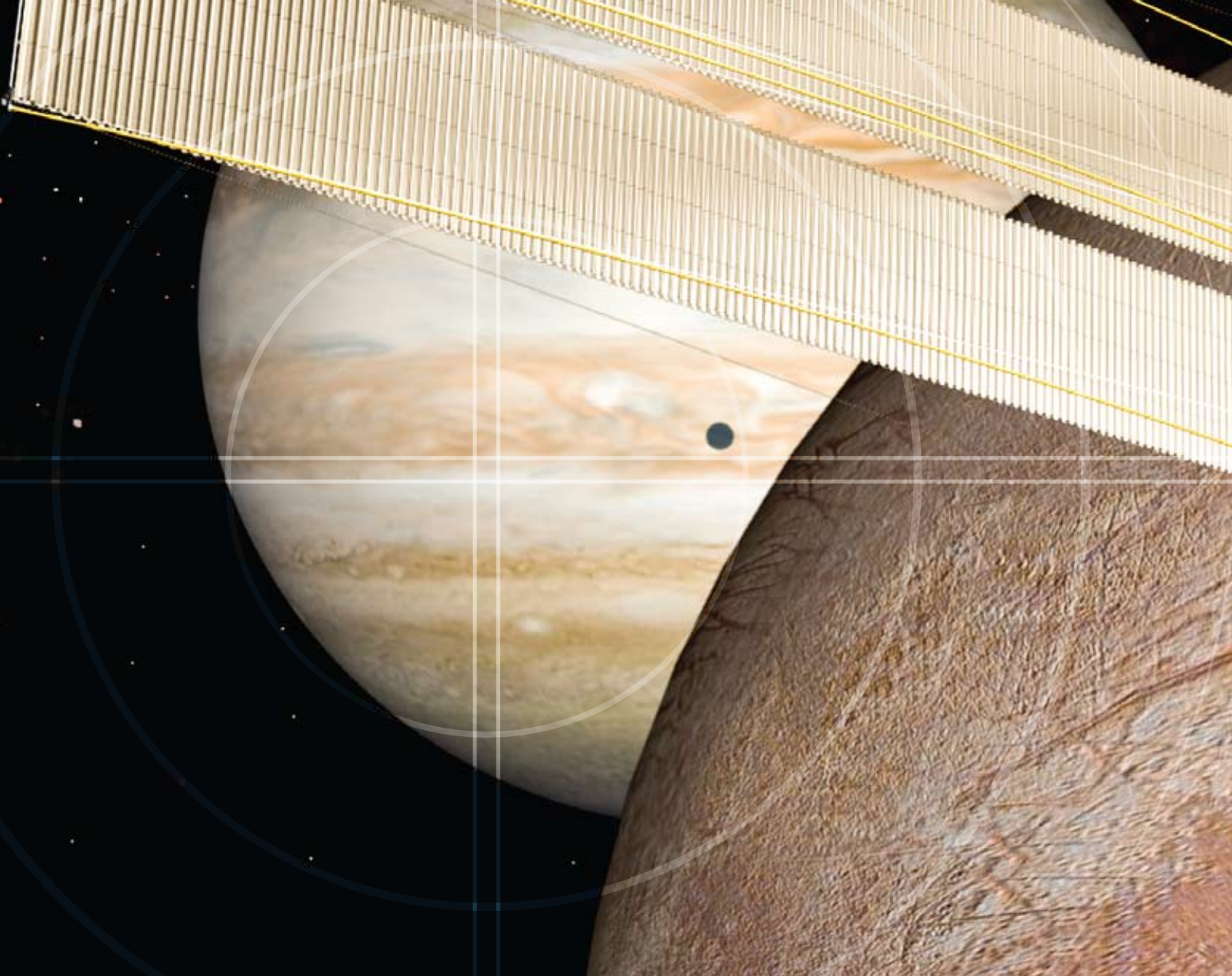
The idea isn’t new; hosted payloads have long been popular in countries with limited military budgets. Both Japan and Brazil have launched hosted payloads, but the Australian deal “was visionary in terms of a commercial operator contracting with a foreign government for a U.S.-built UHF payload,” said Jim Mitchell, director of commercial marketing for Boeing Space and Intelligence Systems.

Hosted payloads have not traditionally been part of the U.S. government satellite acquisition plan, which tended toward larger government-owned and -operated satellite fleets. But tighter budgets are forcing military planners to think about how to get capability in space for less. “We don’t see as many new, large government programs starting up, so hosted payloads is an excellent growth area for our business,” said Steve O’Neill, S&IS vice president of commercial and civil programs. O’Neill said Boeing has experience with UHF payloads dating back to 1993. That history proved to be a “strategic discriminator,” an edge that helped seal the deal with Intelsat.

The arrival of the new Boeing 702B could not have been better timed. Tightening government budgets have put the spotlight on hosted payloads and 702B engineers designed accordingly, creating prime hosting real estate on top of the spacecraft. “There’s an area of the spacecraft called the nadir face that is completely wide open,” said Mike Neuman, 702B program director. “I think of it as a field of dreams—build it and they will come.”

This Earth-facing patch is a prime location for the major types of hosted payloads; UHF communications equipment such as the Australian UHF payload; missile warning packages, which watch the Earth for the telltale heat signatures of missile launches; direct high-speed communication and data links with moving air or ground vehicles; or for space situational awareness, which is knowing where an adversary’s spacecraft are at any time. “It is about flexibility,” Mitchell said. “The satellite has real estate that accommodates any of the four major hosted payload classes, or if the commercial customer wants to put on extra capacity, they can do that too.”

Hosted payloads also have the potential to become an important strategy to enhance space fleet survivability. Smaller payloads placed on many satellites and employed as a distributed system are less vulnerable to launch failures or foreign aggression than single, purpose-built satellites. ■



# TO BOLDLY GO...

Adaptable 702B satellite has potential to conduct science, service and explore

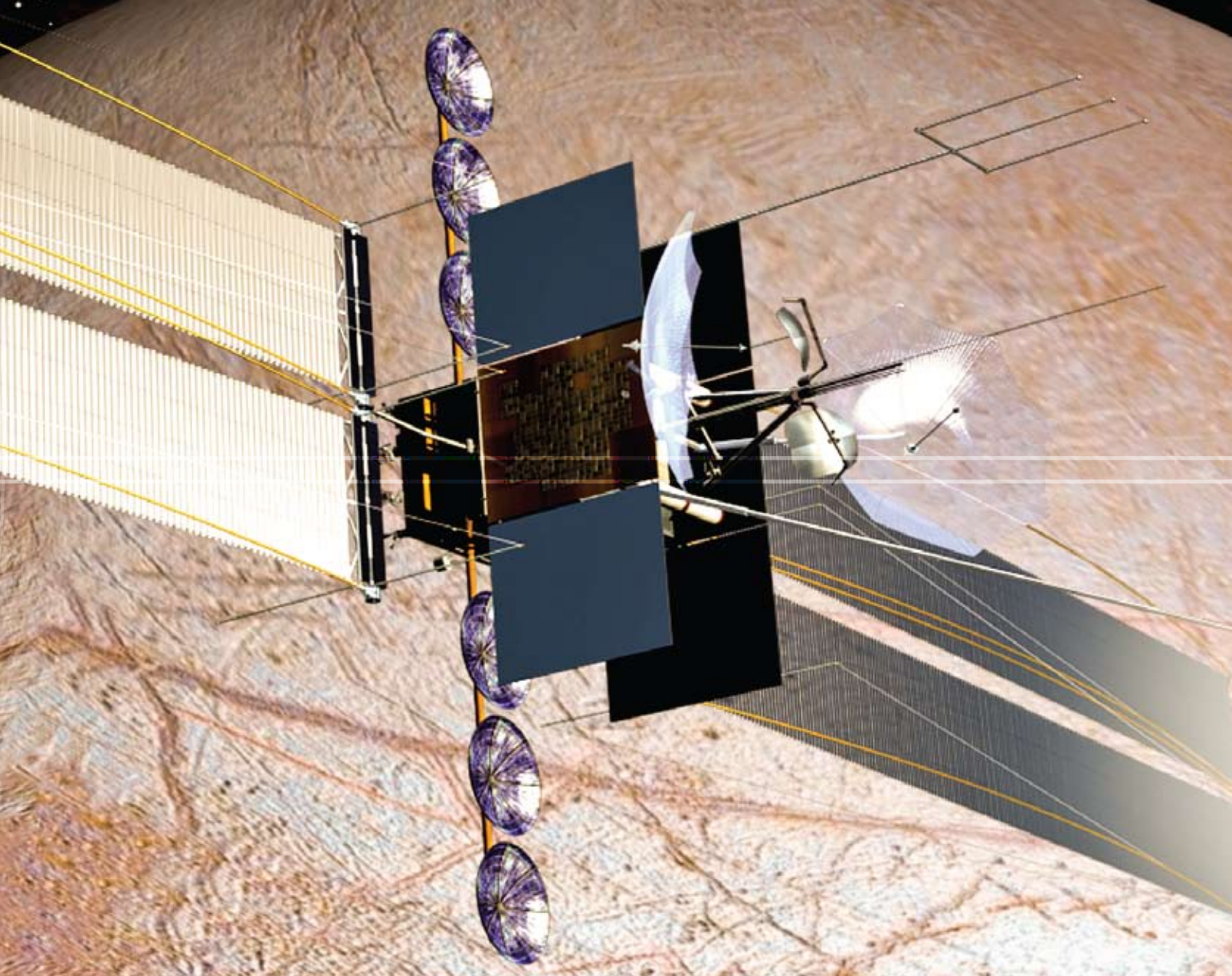
**T**he Boeing 702B could turn out to be one of the more multitalented spacecraft Space and Intelligence Systems has ever built. Designed as a medium-sized, medium-power geosynchronous satellite, it may one day be moonlighting as a planetary or Earth science spacecraft, if people like Mike Elsperman have their way.

As part of Boeing Phantom Works' Advanced Network and Space Systems, Elsperman is in charge of space science pursuits. He and his team think the 702B has "servicing" potential, meaning it could be used for refueling, repositioning or assembling other spacecraft on orbit. "The 702B could serve as the basic spacecraft and a derivative of Orbital Express flight software could provide autonomous guidance, navigation and flight control," Elsperman

said. In 2007, Orbital Express, developed by a Boeing-led team for the Defense Advanced Research Projects Agency (DARPA), successfully performed fully autonomous servicing functions of a client spacecraft on orbit.

All that's tethering the 702B to Earth orbit now is that it hasn't launched yet. "Once it becomes flight-proven, we plan to offer it to the space science community and elsewhere," Elsperman said.

The 702B's older sibling, the more powerful 702, has no such issues. It has 16 missions under its belt and Phantom Works has been presenting it to NASA as a deep space science platform. One idea is a mission to Jupiter and its moons, using solar power. The 702 is equipped with a Xenon Ion Propulsion System, which is a low-thrust but extremely fuel-efficient engine. The more electrical



## “We try to take advantage of the wide range of Boeing capabilities that can be applied to space missions.”

– Mike Elsperman, Boeing director of space science and advanced commercial space, Phantom Works

power sent to an ion engine, the greater the thrust. “The solar panels on a 702 can generate a lot of power,” Elsperman said. “Jupiter is greater than five times the distance of the Earth to the sun and currently requires nuclear power to get there, which has its own risks and challenges.”

Phantom Works’ Tom Kessler runs a program called the Fast Access Spacecraft Testbed (FAST), a DARPA program developing lightweight, compact spacecraft solar power systems. “Using FAST technology, we can fit a 30-kilowatt-power system onto the 702 or 702B, which is 50 percent more powerful and efficient than the largest solar array we have ever launched,” Kessler said.

Around November, NASA will announce its annual competition for new mission ideas for solar system exploration. It is looking

for flight-proven yet affordable systems for missions to asteroids, comets and planets. Elsperman said his team still is working on the “communication satellite as space explorer” concept, but Boeing is determined to enter this competitive market. “We’re not ruling anything out as we try to take advantage of the wide range of Boeing capabilities that can be applied to space missions,” he said. “We have flight systems, mission operations expertise and an extremely talented team of people. We are pushing hard to get our foot in the door and show NASA that we can help it be successful.” ■

**GRAPHIC:** In this artist’s concept, Fast Access Spacecraft Testbed, or FAST, solar panels power a mission to Jupiter’s moon Europa, allowing use of fuel-efficient ion engines. JOHN RANKIN/BOEING

**“The Boeing 702B gives us a visible edge, fulfilling a lot of commercial needs and military mission needs.”**

– Craig Cooning, Boeing vice president and general manager, Space and Intelligence Systems

JOE ORSILLO/BOEING



## ACCELERATING UNIVERSE

### What the satellite business means to Boeing

In October 2000, Boeing announced it acquired Hughes Space & Communications Co. Hughes had a long history of crafting new spacecraft and communications technologies and making market breakthroughs. The deal made Boeing, which was already the largest aerospace company, the world's largest commercial satellite provider and opened new frontiers in the satellite information and communications marketplace.

Fast forward to today. Space and Intelligence Systems is the heart of Boeing's intelligence gathering services and government and commercial satellite programs. S&IS builds satellites and payloads for customers ranging from the U.S. Air Force to DIRECTV, NASA to SkyTerra and dozens of others. Today, well over one-third of the 279 commercial satellites in orbit were built by Boeing at its 1-million-square-foot (92,900-square-kilometer) satellite factory in El Segundo, Calif.

Recently, S&IS introduced its newest offering, the Boeing 702B, to the satellite industry with the announcement that the first four would go to Intelsat. *Boeing Frontiers* recently talked with Craig Cooning, S&IS vice president and general manager, about what the satellite business, and specifically the 702B, means to Boeing.

#### **What impact can satellites have on Boeing's bottom line?**

S&IS is one of our pillars of customer support for the U.S. Air Force, allowing Boeing to build not only aircraft and radios but also satellites to tie them together. This gives our customers the one-stop-shopping capability they want and need.

#### **Defense spending is decreasing. How will that affect the satellite business?**

We are balancing this decline by seizing the opportunity to expand more in the commercial world. Boeing is the only satellite-maker active in both arenas. It is vitally important for us to have product offerings in both. Ten years ago, our business was predominantly commercial; today, approximately 80 percent

comes from the government marketplace. Our unique ability to design satellites that serve both markets, and draw from each to the benefit of the other, is a key discriminator that helps us ensure a constant production flow in our satellite factory.

#### **Is the Boeing 702B a brand-new satellite?**

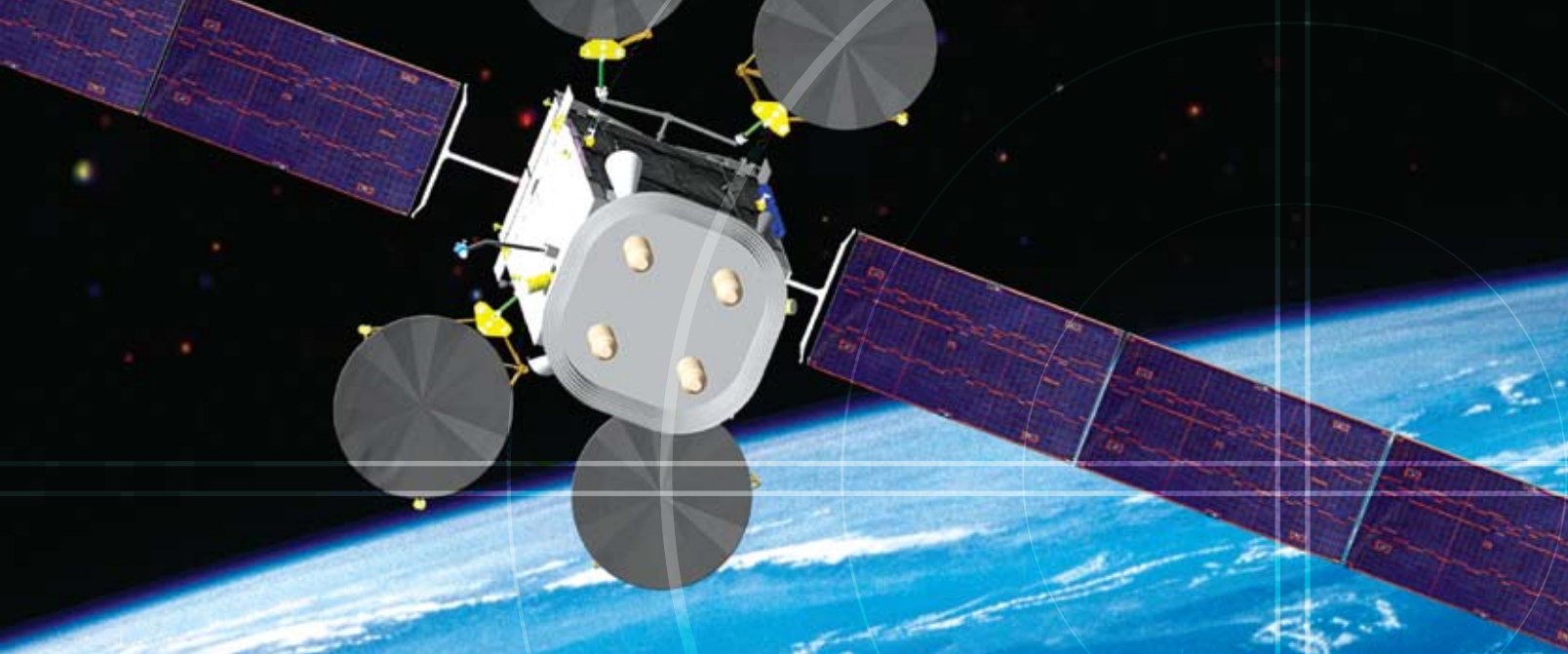
It's an evolution of our current satellite, the 702. The Boeing 702B is designed to operate in middle-power ranges and enables us to provide satellites that meet mission requirements but don't require the highest-power design. We've taken the best of the 702 and incorporated that proven technology into the 702B. It has opened doors to many opportunities in the commercial market. Our customers are very interested because 702B gives them alternatives. The satellite can accommodate different power needs and a wide variety of payloads.

#### **Is the 702B and Intelsat contract Boeing's re-entry into the commercial market?**

I don't believe we ever left. The significance of this contract is that it re-establishes us in the fixed satellite services and broadcast satellite services market. The Boeing 702B gives us a visible edge, fulfilling a lot of commercial needs and military mission needs. No other contractor can say that. What's important to us is to promise what we're going to deliver and deliver on our promises.

#### **The first Boeing 702B has a hosted payload for the Australian Defence Forces. Do you see any U.S. interest in the concept?**

The Air Force is considering expanding its military satellite assets to include hosted payloads, which means putting military equipment on commercial satellites. When you stop to consider the military's soaring demand for communications services and the speed at which a payload can be added to a commercial satellite already under way, you can see the benefits of hosting. There's no doubt that greater satellite capability can save lives. ■



# LEAP OF CONFIDENCE

## 702B order continues Intelsat history of firsts

Intelsat's order for four Boeing 702B satellites makes it the first customer for the new satellite platform. Surprising? Hardly. Not when you're talking about a company that started with its first satellite, "Early Bird," or Intelsat 1, back in 1965. That satellite opened the door to commercial intercontinental voice, telegraph and television transmission via satellite and began Intelsat's 44-year relationship with Boeing.

Intelsat has been at the vanguard of the satellite communications industry ever since. Early Bird was brought back into service in 1969 to assist with the world's first global broadcast, the moon landing. Hundreds of millions of captivated viewers on six continents watched history being made, via Intelsat. In 1998, Intelsat provided the first satellite link to the Internet from Mount Everest.

Today, Intelsat owns and operates more than 50 satellites and seven teleports, connected by 28,000 miles (45,000 kilometers) of fiber, reaching 99 percent of the world's populated regions. Approximately one in every four TV channels carried over satellite goes through an Intelsat satellite, and it is the leading provider of commercial satellite services to the government sector, business, Internet and mobile network operators. Over the years, Boeing has built more than 20 satellites for Intelsat.

Intelsat did not reach its level of success by being timid. "We thought this was a win-win situation for both our companies," said Ken Lee, senior vice president of Intelsat, about the recent 702B procurement deal with Boeing. Indeed, in a landmark agreement, the first of the 702Bs will carry hosted communications equipment for the Australian Defence Force, as well as its commercial communications payload.

Lee said his company chose Boeing not only on price but also with an eye to the future. "Our intent is not just to buy spacecraft but to become partners in other ventures."

"I think the resources Boeing has put into 702B means they are doing the right thing," Lee said. "This is critical not just for our programs but for the next 10 years in the commercial arena. We did a lot of work upfront [and] we are willing to take some leaps, but at the end of the day, failure is not an option." ■

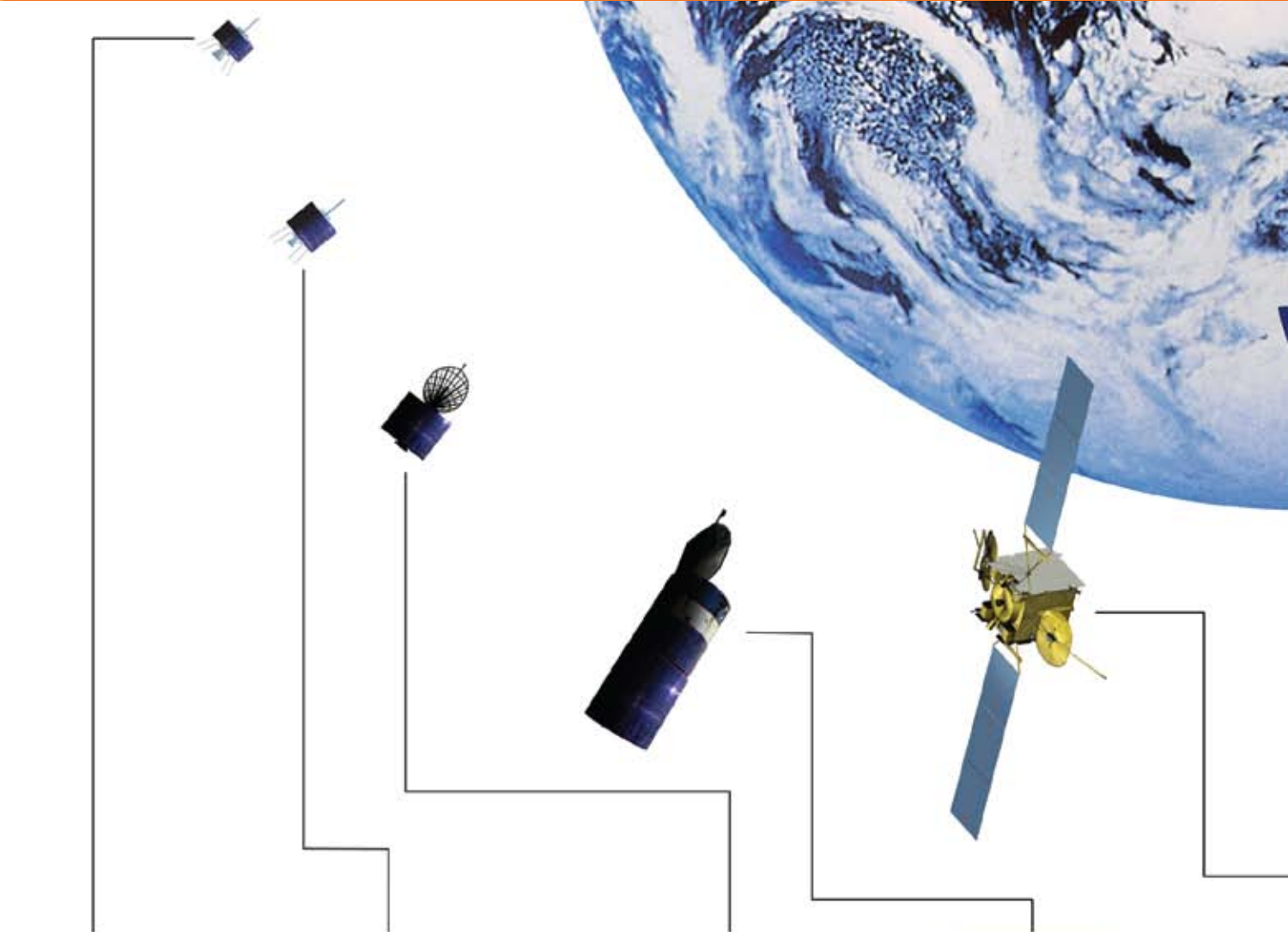
**GRAPHIC:** The first Boeing 702B built will be Intelsat's IS-22. It will carry Intelsat's commercial payload and a hosted Ultra High Frequency payload for the Australian military. 702B was designed specifically to carry both commercial payloads and government hosted payloads. **JIM SANTONI/BOEING**

**"We thought this was a win-win situation for both our companies."**

— Ken Lee, senior vice president of Intelsat  
DAVE MOORE/BOEING



# EVOLUTION OF THE BOEING 702B SATELLITE



## Syncom

Launched in 1963, it was the first geosynchronous satellite. Syncom demonstrated the pioneering “spin stabilized” concept, which was used by the majority of synchronous satellites until the advent of the Boeing 601 in the early 1990s.



## Intelsat I ‘Early Bird’

Launched in 1965 for the newly formed International Telecommunications Satellite Organization INTELSAT, it was the first Boeing 303 model. Intelsat I inaugurated the concept of commercial intercontinental voice, telegraph and television via satellite.



## Anik A

Launched in 1972, it was the first of the new Boeing 333 spacecraft developed for the domestic use of individual nations. The large antenna produced a contoured beam, which concentrated the satellite’s signal within a nation’s borders.



## SBS

Launched in 1981 for Satellite Business Systems, SBS was the first Boeing 376 series. Featuring a telescoping solar panel and folding antenna, it was compact enough to launch from the space shuttle’s cargo bay. It delivered telephone, teleconferencing, computer-to-computer and electronic mail services.



### Optus B

Launched in 1992 for Australia's national satellite communications company, it was the first of the new Boeing 601 body-stabilized satellites. Optus B could orient its solar wings toward the sun and generate up to three times the power of earlier satellites.

### Galaxy

Launched in 1999, it was the first of the larger and more powerful 702 series and is an upgrade of the popular, proven 601. Built for PanAmSat Corp., it expanded video and telecommunications services to North America and Brazil.

### Thuraya

Launched in 2000, for Thuraya Satellite Telecommunications Co. Ltd., it was the first Boeing Geomobile, or GEM, satellite. Based on the 702 model, Boeing built and delivered a complete turnkey system including three satellites, ground facilities and user handsets.

### IS-22

To be launched in 2012, Boeing's 702B is the first of four spacecraft for Intelsat, the first customer. The satellite provides a flexible design to support payloads that range in power from 6 to 12 kilowatts, and can support a variety of hosted payloads.

# Around the world in 82 days

Two Boeing Super Hornets, supported by a lean Boeing-led team, circled the globe performing demonstrations and flying at key air shows

By John Hagan  
Photos by Kevin Flynn

In January, a small Boeing-led team embarked on an ambitious assignment: Take two Super Hornets around the world, stopping to display the aircraft in countries that are potential Super Hornet customers, performing flight displays at major regional air shows and conducting demonstration flights for VIPs. The tour was a key element in Integrated Defense Systems' strategy to bolster international sales. Adding to the team's challenge was a requirement to minimize the spare parts and tools that traveled with the aircraft, minimize impact on the fleet and keep expenses low.

## DAY 1 – LEMOORE, CALIF.

Darryl Lyons, St. Louis maintenance foreman, joins fellow Boeing employees Dan Straeter, Fred Anderson and Dave Wright at U.S. Navy Training Squadron VFA-122 here. The four perform acceptance inspections on two Super Hornet aircraft Boeing has leased for the globe-spanning trip. The jets are fine, no surprise. Next stop: Cecil Field, just outside of Jacksonville, Fla., to begin practice for upcoming air shows and VIP flights.

## DAY 24 – CECIL FIELD, FLA.

Daily flight operations hit their peak with six flights completed. The flexibility of the team is fully utilized, as two of the flights are air show profiles, one a Navy pilot proficiency update, and three are VIP practice flights.

## DAY 27 – ON THE WAY

After 12 days of flying, the team packs its equipment, loads the leased Omega KDC-10 tanker that will accompany it on the trip, refuels and departs on the next leg of the journey. Over the past 12 days the team has completed 45 flights, qualified two pilots for flying air show profiles and trained five Navy pilots on conducting VIP flights. At 7:30 a.m., the two Super Hornets and Omega KDC-10 launch for the Azores, an island chain in the Atlantic Ocean about 950 miles (1,500 kilometers) west of Lisbon. More than six hours later the aircraft land in heavy winds and rain.



## DAY 28 – COPENHAGEN

After a 5.5-hour flight from the Azores, the aircraft land in Copenhagen. The team lands in cold weather—snow and ice everywhere—and the aircraft are towed into a hangar for a reception. Denmark is evaluating the Super Hornet for a future fighter requirement.

While in Copenhagen, four members of the team split from the main group to travel to Bangalore, India, to finalize preparations for the Super Hornets' participation in the Aero India biennial air show. Unfortunately, they have to travel through London just after a storm leaves 12 inches of snow on the ground, cancelling flights and delaying connections. One team member will have to wait a week before he sees all of his luggage again.

## DAY 31 – SOUDA BAY, CRETE

After the reception in Copenhagen, it is time to pack and move again. The team arrives in Crete for an overnight stop before continuing to Qatar, in the Middle East. Refueling is hampered as a local farmers' strike blocks the roads, preventing fuel trucks from getting to the airfield.

## DAY 32 – AL UDEID, QATAR

Another overnight stop finds the team sleeping in a tent at Al Udeid Air Base here. An air-conditioned hotel in Bangalore, the team's destination in India, is going to be great!

## DAY 33 – YELAHANKA AIR BASE, BANGALORE, INDIA

The aircraft land midafternoon. The team is already into its second month of travel, but there's no time to reflect on the trip so far, as both Super Hornets are scheduled for flights tomorrow. And India is a potential Super Hornet customer.

At Aero India, the air show organizers have established a block of time each morning and afternoon for flight demonstrations. Consequently, manufacturers wanting to schedule separate VIP flights have to launch and recover them early in the morning, around lunchtime or late in the afternoon. Boeing pilots Mike Wallace and Ricardo Traven alternate slots flying the air show demonstration routines, and pilots from the U.S. Navy's VFA-122 Super Hornet squadron fly the VIPs. The team's Boeing maintainers launch and recover all flights.

The Super Hornet is the only tactical aircraft flying with external stores in the grueling, low-level air show demonstration routines. The aircraft is configured with representative AIM-9 Sidewinder missiles on the wingtips, AIM-120 AMRAAM missiles on each outboard wing pylon and an MK-83 inert bomb on each midboard pylon.

## DAY 40 – YELEHANKA AIR BASE, BANGALORE, INDIA

Boeing hosts a former India astronaut, Rakesh Sharma, at the air show and provides him a VIP ride in the back seat of the Super Hornet. This is just one of the many VIP flights the team provides to showcase the Super Hornet's capabilities during the trip.

## DAY 44 – PAYA LEBAR, SINGAPORE

Following completion of the Aero India, it is time for the team to head east, again. During nine flying days in Bangalore the



**PHOTOS: (TOP)** The Super Hornets are ready for flight after a stop in Souda Bay, Crete. **(MIDDLE)** Boeing air show pilot Mike "Sting" Wallace (right) discusses aircraft status with Dave Wright (far left) and Darryl Lyons prior to a flight in India. **(ABOVE)** John Kloppenburg, Customer Relations & Exhibits Team lead, greets onlookers at the Aero India air show.



**PHOTOS: (TOP)** Two Super Hornets from VFA-122 fly over the coast of Malaysia. **(MIDDLE)** Former India astronaut Sharma Rakesh prepares to fly the F/A-18F Super Hornet at the Aero India air show. **(ABOVE)** Pilot Ricardo Traven folds the wings of a Super Hornet as if to wave to the crowd at the Avalon Air Show in Australia after demonstrating the aircraft's abilities.

Super Hornets flew 32 flights with a peak rate of five per day. The team spends the night in Singapore en route to Australia, and its many appointments there.

**DAY 45 – DARWIN, AUSTRALIA**

The team lands in Darwin and drives three hours south, into the Outback, to arrive at RAAF Base Tindal, Northern Territories. The Royal Australian Air Force will accept its new Super Hornets starting next year and the aircraft generate a lot of interest at the airfield.

While at Tindal, the team introduces the Super Hornet to RAAF personnel, completes air show currency flights and trains new U.S. Navy pilots who have joined the team on the intricacies of flying VIPs.

**DAY 51 – RAAF BASE WILLIAMTOWN, AUSTRALIA**

The team moves to the southeastern coast of Australia to RAAF Base Williamtown, near Newcastle, New South Wales. Here it will conduct VIP flights and fly additional air show profiles to maintain currency.

**DAY 54 – RAAF BASE WILLIAMTOWN, AUSTRALIA**

Australia's then-Minister of Defense, Joel Fitzgibbon, travels to Williamtown to meet the Boeing crew and holds a short news conference beside the Super Hornet. Fitzgibbon praises the aircraft and the capabilities it will bring to the Australia Defence Force.

**DAY 59 – AVALON, AUSTRALIA**

After 12 flights in five flying days in Williamtown, it is time to move to the Avalon airfield just outside of Melbourne, Victoria. This will be the site of the 2009 Airshow Down Under, which is an international showcase for all types of aircraft. This is the fourth time the Super Hornet has flown at this air show and it is always a highlight of the flying program.

The Super Hornets fly 18 flights in Avalon, a mixture of air show demonstrations and VIP profiles.



### DAY 75 – PAGO PAGO, AMERICAN SAMOA

With air show and VIP flights complete, the team starts the long journey home with a 6.5-hour ferry flight to Pago Pago, capital of American Samoa, in the south Pacific. The aircraft cross the international date line during the flight: The team launches on Friday morning from Australia and lands in Pago Pago Thursday afternoon.

### DAY 76 – HONOLULU

The team is back in the United States for the first time since January. There isn't much interest in touring the local area, though. Everyone is focused on getting back home.

### DAY 78 – NAVAL AIR STATION LEMOORE, CALIF.

The team's two Super Hornets complete their around-the-world journey with a five-hour ferry flight from Hawaii to Lemoore. Cmdr. Chip Boogerd and Lt. Joshua Ensign have the distinction of flying the same aircraft on each ferry leg—each circling the world in one aircraft. The work is not over for the Boeing maintenance team, however, as control sticks added to the aft cockpit of each Super Hornet when the tour started in January need to be removed to return the jets to normal training squadron configuration.

### DAY 80 – ST. LOUIS

Most of the Boeing team returns home when the Omega tanker stops in St. Louis.

### DAY 82 – PATUXENT RIVER, MD.

The KDC-10 touches down at 11 a.m. on March 27, returning Dave Wright and Fred Anderson home. For many on the team, however, it will be a short stay at home, as some members are slated to travel to Naval Air Station Oceana, in Virginia Beach, Va., to support a Brazil Super Hornet flight evaluation in less than a week. For a few days though, the team can reflect on a highly successful world tour—two Super Hornets, 30,000 miles (48,300 kilometers), 144 flights and a mission completion rate of 100 percent. ■

*john.l.hagan-jr@boeing.com*



**PHOTOS: (TOP)** The eight Boeing maintenance personnel responsible for the world tour's 100 percent aircraft mission-success rate are shown flanked by Indian air force personnel. From left: Dan Straeter, Chuck Norton, Darryl Lyons, Fred Anderson, Gary Maynard, Dave Wright, Tom Meier and Rick Queen. **(ABOVE)** A VFA-122 Super Hornet flies over the New South Wales coast in Australia.



# Transformers 22

The V-22 is transforming the way the military conducts its missions

By Jeff Barnett

**T**here's possibly no more specialized need for transportation than within the U.S. Department of Defense, and no more specialized aircraft than the Bell Boeing V-22 Osprey. The Defense Department relies on two versions of the same bird—the CV-22 in service with the Air Force Special Operations Command (AFSOC) and the MV-22 in service with the Marine Corps—to perform two very different missions.

These missions take full advantage of the V-22's transformational combination of speed, range and flexibility to help the warfighter accomplish his or her tasking more quickly, effectively and safely than ever before. Boeing manufactures the V-22 in partnership with Bell Helicopter Textron Inc.

## **MATCHING MISSION TO PERFORMANCE**

The USMC relies on its Osprey, the MV-22, to perform the critical mission of assault support transport. Whether it's moving Marines and material from amphibious shipping inland or supporting troops on the ground from austere

land bases, the MV-22 is well-suited for the support role.

AFSOC relies on the CV-22 Osprey to insert and extract special operations forces into highly sensitive, highly dangerous areas, whether behind enemy lines or near vital areas of conflict. Special operations rely on stealth and speed to achieve success; key is getting special operators into action and out of harm's way quickly and safely.

The V-22 has a unique tilt-rotor configuration, which gives the aircraft the ability to expediently change from vertical flight to horizontal flight, taking advantage of the best features of rotorcraft and fixed-wing aircraft. With its engine nacelles in the vertical position, the V-22 can take off, hover and land like a helicopter. Tilting the nacelles forward during flight allows the V-22 to fly like a fixed-wing turboprop aircraft, capable of high-altitude, high-speed flight.

## **FLEXIBILITY, SPEED AND RANGE**

The Osprey's ability to take off and land like a helicopter makes it an optimal solution for forward area maneuver,



according to Boeing officials. Like a helicopter it can land in areas that aren't prepared for fixed-wing aircraft, putting troops and supplies exactly where they are needed with no need for a runway. It also can deliver 24 combat troops and sizable amounts of supplies. This includes up to 20,000 pounds (9,070 kilograms) of internal load and the ability to sling-load, or carry underneath the aircraft, as much as 15,000 pounds (6,800 kilograms).

In addition to its ability to take off, hover and land like a helicopter, the Osprey offers the warfighter the speed and range of a fixed-wing turboprop aircraft. This ability to fly farther (mission radius for the MV-22 is 430 nautical miles—495 miles, or 800 kilometers) and faster (up to 250 knots—288 miles per hour, or 463 kilometers per hour at sea level) than conventional helicopters allows the V-22 to accomplish and expand upon many traditional helicopter missions. And by flying higher and faster than helicopters, the V-22 can avoid many types of air defenses.



**“The V-22 is the most technically advanced aircraft flying. It is a revolutionary aircraft helping us win the war on terror.”**

– Mike Watson, V-22 electrician

**“It's vital that everyone who builds this aircraft keep their focus on quality and maintain a foreign object debris-free environment. It's a phenomenal aircraft and I'm thrilled I have the opportunity to work on it.”**

– Shalamar Miller, V-22 sheet-metal assembler





## COMBAT PROVEN

The USMC specializes in the difficult missions of amphibious assault and ground combat, getting Marines and assets from ships over the horizon and into battle quickly and safely. This tasking makes maneuver and resupply critical to their mission. The Marines rely on the MV-22's range, speed and payload capabilities to move troops and supplies within the theater of operations.

A squadron of MV-22s recently returned from the aircraft's first combat deployment in Operation Iraqi Freedom, where the aircraft flew thousands of sorties, logging nearly 10,000 flight hours. In Iraq, the Osprey performed a wide variety of missions, moving troops and cargo in-theater.

"The aircraft completed every assigned mission," said USMC Lt. Gen. George Trautman, Deputy Commandant for Aviation, during a recent Defense Department bloggers roundtable, "and it did so flying faster, farther and with safer flight profiles than any other assault support aircraft in the history of military operations."

Soon after their return to the United States, the MV-22s

were deployed shipboard and have already been pressed into service in the medical evacuation role. In June, MV-22s from the USS *Bataan* evacuated an injured sailor from the ship to shore-based medical facilities, flying 147 nautical miles (170 miles, or 270 kilometers) in less than 40 minutes.

AFSOC is tightly focused on special operations, and its CV-22 is optimized for flying at night and at low altitudes. To accomplish its mission, the CV-22 Osprey is fitted with terrain-following radar, the Directed Infrared Countermeasure system and the Suite of Integrated Radio Frequency Countermeasures—navigational and defensive systems designed to protect the crew and aircraft. These systems allow low-flying CV-22s to use terrain to remain hidden from radar and visual identification. And since the CV-22 is quieter than conventional rotorcraft, it can enter and leave operational areas with a degree of stealth. These features allow the CV-22 to insert and extract special operators quickly, precisely and unobtrusively.

AFSOC put the CV-22 through its paces during Operation



Flintlock in late 2008, supporting the training of indigenous and international troops in the trans-Saharan region of Africa. The aircraft also was used in Special Operations training in the Caribbean, deploying and recovering special operators in various scenarios. AFSOC also learned much about the aircraft's range and maneuverability earlier this year when it deployed the aircraft to Honduras, where the CV-22 supported a humanitarian aid campaign in the nation's rugged countryside.

Perhaps Lt. Col. Mike McKinney, one of the Air Force's most experienced CV-22 pilots, with more the 500 hours in the Osprey cockpit, put it best. In a recent *Defence Helicopter* article McKinney said, "I have never, ever, been in an aircraft that can do as much stuff as this [one] does." ■

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**PHOTOS:** U.S. Air Force CV-22 Osprey (pages 28–29). SHELDON COHEN/BELL HELICOPTER U.S. Marine Corps MV-22 Osprey (pages 30–31). U.S. NAVY (INSETS) Boeing V-22 employees. FRED TROILO/BOEING



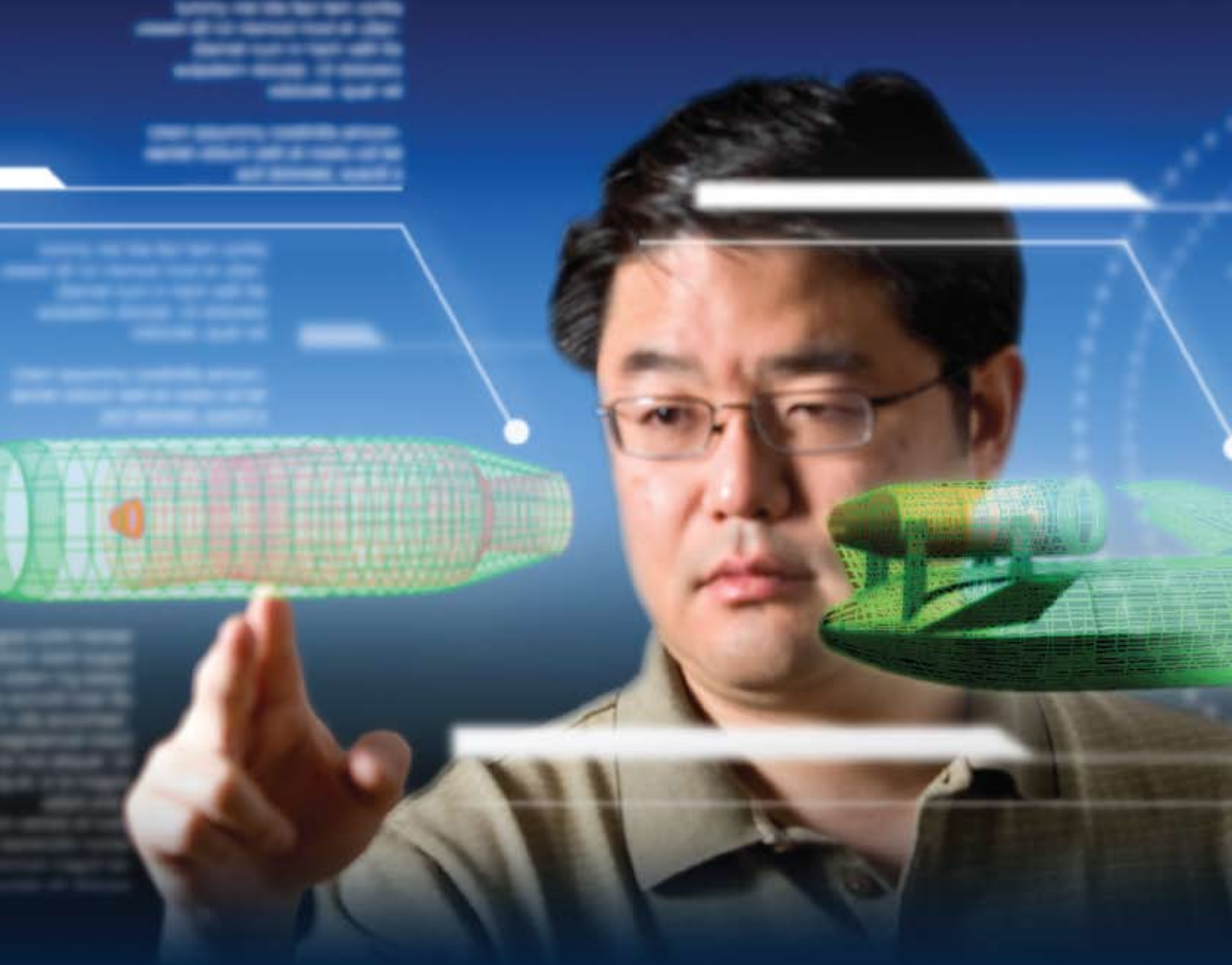
**"Every day, my co-workers and I work in a world-class environment and build this remarkable aircraft ... as if our own children were flying the aircraft."**

*– Rich Chambers, V-22 sheet-metal assembler*

**"I've been on the V-22 program from its beginning and was a captain on the first Employee Involvement team that helped design this focused factory. I'm proud to work on this aircraft."**

*– Jim Cucchi, V-22 sheet-metal assembler*





# Garnering great ideas

Boeing is harnessing employees' ideas online to help shape the company's future

By Conan Kisor

**B**oeing is joining the growing number of global enterprises that use advanced Web-based collaboration practices to rapidly solicit, capture, refine and synthesize ideas from employees to drive innovation. Among those practices is Ideas to Innovation, or I2I, a suite of services offered by Integrated Defense Systems' Phantom Works organization that helps the company capture and organize ideas from the right people—at the right time—to tackle business challenges.

Conceived and managed by Phantom Works' Analysis, Modeling, Simulation & Experimentation (AMSE) division, I2I might best be described as organized, intensive and secure online brainstorming in a compressed time frame. It includes

an automated system to recruit participants and software to prioritize and evaluate their ideas. An I2I "event" works like this:

- A sponsor poses a strategic business challenge seeking employees' ideas using Idea Central, a commercially available software product developed by Imaginatik.
- Potential participants from around the company are identified using methods that ensure a knowledgeable and diverse sample of a target employee population. They are tapped via e-mail when the event begins.
- Over a set number of days, participants post ideas to the event Web site, submit supporting documents, pose questions, build on others' suggestions and even vote on ideas.



# “We had ideas from all over the company, from people we never would have thought to contact.”

– Bill Freiberg, capture team lead, Boeing Phantom Works' Advanced Systems Concepts and Exploration

- Throughout the event, the sponsor reviews submissions and selects those that are most promising, innovative and feasible—often asking follow-up questions to clarify and further develop employees' ideas.

Boeing teams that have used the I2I idea generation capability include the Enterprise Technology Strategy organization. That team is using I2I to foster novel ideas in manufacturing technology. One of this group's goals is to devise a common set of automated, non-intrusive measurement and machine “visioning” technologies that could improve and unify the multiple measurement systems used across Boeing's production sites.

“We're looking to invest in technologies that collect and analyze data in real time—those that won't require key steps in the manufacturing process to pause while a measurement is taken,” said Mike Vander Wel, who leads the Manufacturing Domain. It's one of eight companywide technology groupings, or domains, in Boeing's Enterprise Technology Strategy designed to better integrate and focus Boeing's technology investments. He pointed to laser tracker technology as an example of a system that can disrupt production due to sensitivity to temperature fluctuations caused by factory doors opening, or to vibrations caused by people moving near production hardware.

Using a weeklong I2I event, the Manufacturing Domain surfaced 84 ideas about potential innovations in machine visioning from more than 330 engineers and technical experts from 22 sites around the company. “We received ideas from Information Technology people, systems engineers, people working on network-centric programs, even those in the aftermarket and spares organizations,” Vander Wel said. “I2I greatly expanded our reach in tapping into the broad expertise we have within the company. The event surfaced a lot of great ideas, and now there is more work to be done to create a machine visioning architecture, a technology road map and a plan.”

Boeing is not alone in its employee-centric approach to stimulating innovation. Global companies such as IBM, Pfizer and Chevron also are using centralized approaches like I2I to harvest employees' business ideas. An IBM study found that a company's employees are the single most significant source of innovative business ideas, outpacing partners, customers, consultants and even competitors.

“At Boeing, the I2I process helps the company obtain and cull through hundreds of reasonable business suggestions so that the

‘pearls’ can rise to the top,” said Rob Williams, senior manager of Innovation & Integration, AMSE. “What's more, I2I events are Lean; they can be conducted on short notice and don't require travel or significant meeting costs.”

In addition to big-picture business challenges, I2I is being used for tactical purposes. For example, when an opportunity arose for Phantom Works to respond to a request for proposal (RFP) from a defense customer on a very tight deadline, the proposal team used an I2I event concurrent with its own concept-development methods. More than 180 employees contributed. Within 10 days of RFP release, the team had 85 suggestions regarding structures, lifting surface geometry, propulsion and flight controls for a novel aircraft concept.

“We had ideas from all over the company, from people we never would have thought to contact, and several ideas validated the direction the proposal was heading,” said Bill Freiberg, capture team lead for Boeing Phantom Works' Advanced System Concepts and Exploration unit. He noted that without I2I, he would have had to identify and reach out to colleagues individually for ideas for the proposal, which would have been very time-consuming. Indeed, he estimated that I2I saved his team between \$50,000 and \$100,000.

For employees, I2I provides an immediate way to contribute ideas and knowledge that could significantly shape the company's future. For the company, I2I enables organizations to benefit from the expertise of an unprecedented depth and breadth of Boeing talent more rapidly and efficiently than ever before.

“That's important, because the ability to nimbly adopt technical advances and other successes across the company will help Boeing gain a competitive advantage, enter new markets and strengthen decision-making,” said Guy Higgins, vice president, AMSE.

Any Boeing organization seeking to learn more about the program may send an e-mail to [robert.t.williams2@boeing.com](mailto:robert.t.williams2@boeing.com). ■

[conan.h.kisor@boeing.com](mailto:conan.h.kisor@boeing.com)

**GRAPHIC: (LEFT)** Phantom Works engineer Kentaro Sugiyama is shown with an aircraft concept related to a proposal for a defense customer. An Ideas to Innovation event enabled 180 Boeing people to rapidly contribute their ideas on aspects of the project.

BRANDON LUONG/BOEING; PHOTO BY RON BOOKOUT/BOEING

# Talking tanker

## Boeing gears up for U.S. Air Force tanker competition

By Stacey Holloway

**R**ick Lemaster is the man at the center of one of Boeing's largest and most talked about campaigns. He's program manager for the KC-X tanker. With the U.S. Department of Defense release of its draft request for proposal (RFP) for the KC-X imminent, and contract award expected next summer, *Frontiers* spoke with Lemaster about the program and its future.

### What is the KC-X program?

The Department of Defense is moving forward with the KC-X competition, with plans to purchase 179 new aerial refueling tanker aircraft in the first of several measures to replace the 415 Boeing KC-135 Stratotankers in inventory. Based on our previous competition, we are preparing for a firm proposal that comprises 179 aircraft or 15 tankers a year, for 12 years. There also is a follow-on buy, called KC-Y, that could bring the order potential to 400 airplanes.

### Can you tell readers what the people in the program are currently working on?

We are working at a feverish pace in order to get ready for this next competition. At this point, we do not know what the U.S. Air Force customer is going to want. But I can tell you that Boeing has the best range of options out there. If our customer wants the medium-sized aircraft, we have an excellent, state-of-the-art 767 airplane. If they want a larger airplane, we have our 777, which is bigger and better than our competitor's aircraft. We are

getting ready to make both of those offers to the Air Force depending on what the RFP states they value in an aircraft. Currently, we are refining our 767 offer, defining the 777 configuration, aligning our suppliers and partners, and making sure we have a good understanding of what the technical requirements need to be so that we are ready to write the proposal and deliver it in a short period of time.

### This is the third time that Boeing has pursued this program. What do you think is different about this competition, both for the U.S. Air Force and for Boeing?

The environment is different. This time around everyone is being very, very careful. As I said before, the focus is on what the Air Force values in its tanker capability, and that is going to drive what we offer and how this whole competition proceeds. There is a lot of uncertainty associated with it right now and we don't really know what they are going to put on the street with the RFP, so we are preparing for everything.

### There has been a lot of news surrounding Boeing's KC-7A7 concept. Can you describe what that is and why we're using it?

The 7A7 speaks to our range of options that we can offer to the Air Force customer based on its requirements. The 7A7 is what we'll call our KC-X offer. The "A" between the two 7s stands for Ability—Boeing's experience at building and modifying tankers ... more than 2,000



**PHOTOS:** Rick Lemaster, shown in his St. Louis office, leads the KC-X campaign for Boeing. **RICHARD RAU/BOEING**

“If our customer wants the medium-sized aircraft, we have an excellent, state-of-the-art 767 airplane. If they want a larger airplane, we have our 777, which is bigger and better than our competitor’s aircraft.”

– Rick Lemaster, Boeing program manager, KC-X tanker

of them. It stands for Advanced—our next tanker will have the most modern equipment and design features that our warfighters need today. It stands for Available—Boeing is delivering 21st-century tankers and they are in operational service today. And it stands for Agility—a tanker that can operate around the world in any airspace, in harm’s way, while refueling any receiver, anytime, anywhere.

**What is the advantage of offering a 767-based tanker? How about a 777-based tanker?**

The 767’s footprint is only a little larger than the KC-135, but it provides a twin-aisle capability. The 777 is much bigger than the KC-135 aircraft in terms of its overall size, meaning you can carry or offload more fuel. It is only slightly larger than the competitor’s aircraft, but the 777 provides significantly increased fuel offload. It also provides better payload capability in terms of both passengers and cargo.

On a military base or an airfield within the area of military operations, you are concerned with how you flow the aircraft in and out to accomplish the mission. If I have a limited amount of aircraft available because I have fewer large aircraft parked on the ground, it takes me longer to cycle aircraft in and out, which means that they are not flying, delivering cargo or delivering passengers or fuel. Having more, smaller 767s flying allows more receiver aircraft to get the fuel and continue to execute their missions, effectively putting more gas available at more locations in the sky.

**“[We] are going to leverage some of the successes from commercial derivative programs like the U.S. Navy’s P-8A Poseidon and follow the path they have pioneered.”**

A criticism we have heard about the 767 is that it is an old airplane at the end of its production life. However, one of the things people may not know is that we are going to be making changes to the 767. We are going to put a digital cockpit into the airplane so it is every bit as advanced as what we are putting into the 777 or 787. This will not be the same 767 described several years ago. We also are leveraging the successes we’ve had with our international tanker programs, which are based on 767 platforms. The Japanese tankers achieved initial operational capability earlier this year, and we are getting ready to deliver tankers to the Italians.

We expect the competitor will continue to offer their bigger airplane and argue for changes in the concept of operations that take advantage of its ability to carry more fuel and be able to stay in the air longer.

So it really comes down to what the Air Force wants. If the Air Force really does value a larger airplane, we have a great one in the 777. If they want something that is more along the lines of what they traditionally valued as a replacement for the KC-135, we have a great one of those, too, in the 767. Once the design and build properties for the KC-X 7A7 are finished, it will be the very best tanker aircraft ever built.

**When will Boeing make the decision whether to offer a single platform or both the 777 and 767?**

We are hopeful that when the RFP is released that the Air Force will define their requirements in concrete terms, and then we will choose which of our aircraft makes the very best product for them. We do not want to be in the position of offering two proposals.



“We are going into this with our eyes wide open and realize that this is going to be a very, very tough competition to win.”

– Rick Lemaster, Boeing program manager, KC-X tanker

**GRAPHIC:** Both of Boeing’s potential KC-X tanker offerings are showcased in this artist’s concept of a 767 Tanker (top) preparing to refuel a 777-based tanker.  
CHUCK SCHROEDER/BOEING

**When will you make an announcement regarding the aircraft decision?**

We will make the announcement at the right time, which is based on our desire to preserve our competitive advantage. I believe it will be at the time we submit our proposal.

**How are we leveraging the power of “One Boeing” to ensure a successful outcome?**

We have really embraced the One Boeing concept. We are taking it further and trying to figure out even more ways to break down barriers between Integrated Defense Systems and Commercial Airplanes. For example, we are setting up a joint program office construct for employees that will not have an affiliation back with their home organizations.

We have a lot to do to try to work through our procedures and our processes to ensure we remain Boeing-compliant, but by doing so, this will allow us to work more effectively and efficiently than previous programs. And lastly, we are going to leverage some of the successes from commercial derivative programs like the U.S. Navy’s P-8A Poseidon and follow the path they have pioneered.

One other advantage we have is the passion of the Boeing people who are involved in this campaign. It really has been an emotional roller coaster ride for most of them, having worked so hard on the initial proposal, lived through the protest sustainment and now having a second chance to win this competition. I was

**“The 767’s footprint is only a little larger than the KC-135, but it provides a twin-aisle capability. The 777 is much bigger than the KC-135 aircraft in terms of its overall size, meaning you can carry or offload more fuel. It is only slightly larger than the competitor’s aircraft, but the 777 provides significantly increased fuel offload.”**



fortunate in my last competition to work with a talented, dedicated crew in Philadelphia. You can't teach that passion and I'm really pleased to see it in the faces of the tanker people I'm working with here in St. Louis, in Everett, in Wichita, in Long Beach and around the company. Working together we can win this competition.

**What are some of the lessons learned from the previous KC-X campaigns that Boeing is employing in the current competition?**

The biggest thing we have learned over the course of the past three or four years is the importance of really listening to our customer. It is a fundamental concept, but you can easily lose sight of it when you are in the heat of a competition. We are listening to our Air Force customer and we are going to give them the product that we believe meets their requirements the best.

**What do you see as our biggest challenge to winning the KC-X contract?**

We are going into this with our eyes wide open and realize that this is going to be a very, very tough competition to win. We have to make sure that we have the absolute best price, lowest risk and best schedule we can offer to give the Air Force the very best airplane for the mission. ■

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**“We ... are leveraging the successes we’ve had with our international tanker programs, which are based on 767 platforms. The Japanese tankers achieved initial operational capability earlier this year, and we are getting ready to deliver tankers to the Italians.”**

**PHOTO:** Two Boeing KC-767J tankers are shown in formation flight in 2008 prior to delivery to the Japan Air Self-Defense Force. Boeing has delivered a third KC-767 to Japan and is building a fourth. ROBERT SHADY/BOEING



# Room with a view

A problem-solving technique from Japan is helping Rotorcraft Systems improve—and increase—production

By Jeff Barnett

**T**he H-47 Chinook and V-22 Osprey programs recently received multiyear contracts from the U.S. Department of Defense that will require production rates to more than double over the next five years. This will require an increase in output to seven Chinooks and five V-22 fuselages per month by 2014.

Although the solution to this Rotorcraft Systems challenge seems simple enough—increase the rate of production of Chinooks and Bell Boeing V-22 Ospreys—increasing production creates a number of challenges of its own. Building more aircraft means increased resource and manpower needs, as well as mounting capital requirements. It also creates a greater need to integrate planning, scheduling and the work itself in a way that's transparent to everyone involved.

"The operational tempo of our forces around the world presents definite challenges in our production and manufacturing

schedule," said Obie Jones, director of operations and Philadelphia site leader. "We want to make sure we supply our warfighters with the rotorcraft they need to get the mission done and get home safely."

To meet the challenge, Rotorcraft Systems put into action an effective, proven problem-solving tool that combines the power of people and the strength of the team to help prevent problems and create solutions. It's called the Obeya process.

Obeya is a Japanese term that translates into "big room" in the English language. In the business environment, Obeya translates into increased coordination among ordinarily disparate groups.

Under the Obeya process, teams are gathered from disciplines throughout the manufacturing and production processes and meet regularly, in a "big room," to focus efforts and coordinate actions.

## “Team members ‘see’ the process and know where and when actions need to be completed and where problems might arise.”

– Obie Jones, director of operations and Philadelphia site leader

The theory behind Obeya is based on a simple idea: Dedicate time and space to coordination and problem-solving and organizational barriers will be minimized. The result: effective solutions and actions that can be developed and implemented quickly.

A staple in the Japanese auto industry, Obeya promotes coordination, strategy and flexibility while leveraging the expertise and support of teammates from diverse areas. The process allows the teams to see issues and challenges before they have an impact on production—not afterward, when resolving them can be time-intensive and costly.

“To meet the demands of our customers and make our production process as lean and effective as possible we needed to sharpen our focus on quality and product integrity, Jones said. We think the Obeya process does just that ... increasing the kinds of communication and coordination among our teams that make an impact on the end result.”

The room itself plays an important part in the process. Its walls are lined with boards that help teams visualize and track vital actions that are in process and scheduled. This helps team members “see” the process and know where and when actions need to be completed and where problems might arise.

Joe McCann, senior manager, Industrial Engineering, was tapped to facilitate the production Obeya process at the Philadelphia site in August of 2008.

“Once a week, representatives from more than 20 areas gather to discuss actions and solutions,” said McCann. “These areas include functions, programs, factory support, staffing, supplier management and quality. These meetings are more than just status reports, Obeya team members can request help from other disciplines, develop ideas within the group and rely on the wealth of expertise in the room.”

“The advantage of the Obeya process is, it allows you to share rate readiness activities with the different disciplines,” said John Labanda, staff analyst, V-22 Operations.

“It allows you to talk about what your team is doing near term and in the future to prepare in achieving our goals ... communication is key and that’s why this process works.”

“This new process has enabled integration of our rate readiness activities across the site,” said Jones. “All our stakeholders are included and communication of rate readiness activities has improved significantly.”

The V-22 team has already seen an impact on its TAKT time, or the amount of production time required for each aircraft fuselage. The team was able to lower its time from 10 days to eight days. The H-47 program has also seen success, lowering its TAKT time to a seven-day cycle.

“The Obeya process has allowed us to play a proactive rather than reactive role,” Labanda added. “We identified and articulated the need for critical and near-term capital equipment and major tooling before they were issues.”

“The Obeya process is an approach to project management that has proved very effective,” McCann noted. “With this tool, we feel we have a great way going forward to meeting our production goals.” ■

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**PHOTO:** The room itself plays a key role in the Obeya process, offering visual progress metrics and milestones. From left: Joe McCann, senior manager, Industrial Engineering, Steve Bowe, methods process analyst, Industrial Engineering, and John Labanda, staff analyst, V-22 Operations. FRED TROILO/BOEING



# To the moon? Or beyond?

## White House to decide human spaceflight direction

By Ed Memi

**D**o we want to go to Mars, a nearby asteroid or back to the moon? Or none of them? These are some of the options that Norm Augustine, a former aerospace industry executive, and his panel of fellow space industry experts, former astronauts, ex-government officials and academics have been deliberating. For the past 90 days, Augustine's committee has conducted an official Review of U.S. Human Space Flight Plans, and its report could help decide the United States' future in space.

Top White House officials will make a decision soon that will affect some 3,500 Boeing Space Exploration employees in Texas, Florida, Alabama and California. Established as an independent review by President Barack Obama in May, the Augustine committee has held public meetings near three NASA centers that support human spaceflight, and last month it presented options for the future course of U.S. space policy. The review is set against some even larger challenges: NASA faces an estimated \$70 billion shortfall for its current plan to return humans to the moon by 2020.

Some of the options presented by the committee could change plans—already well under way—for the next generation of spacecraft to return humans to the moon and journey beyond. One of those is the Ares I rocket that will launch astronauts in their Apollo-like capsule, known as Orion. Boeing is under contract with NASA to produce the Ares I upper stage, or second stage, as well as the avionics, or “brains,” of the rocket.

“Whatever their direction, there will be business that Boeing can engage in and there may be an improvement over the business opportunities that we have today,” said Joy Bryant, Boeing vice president and program manager of the International Space Station. She

said the review is something Boeing employees should embrace as part of the U.S. democratic process as well as an opportunity to highlight the value of human spaceflight.

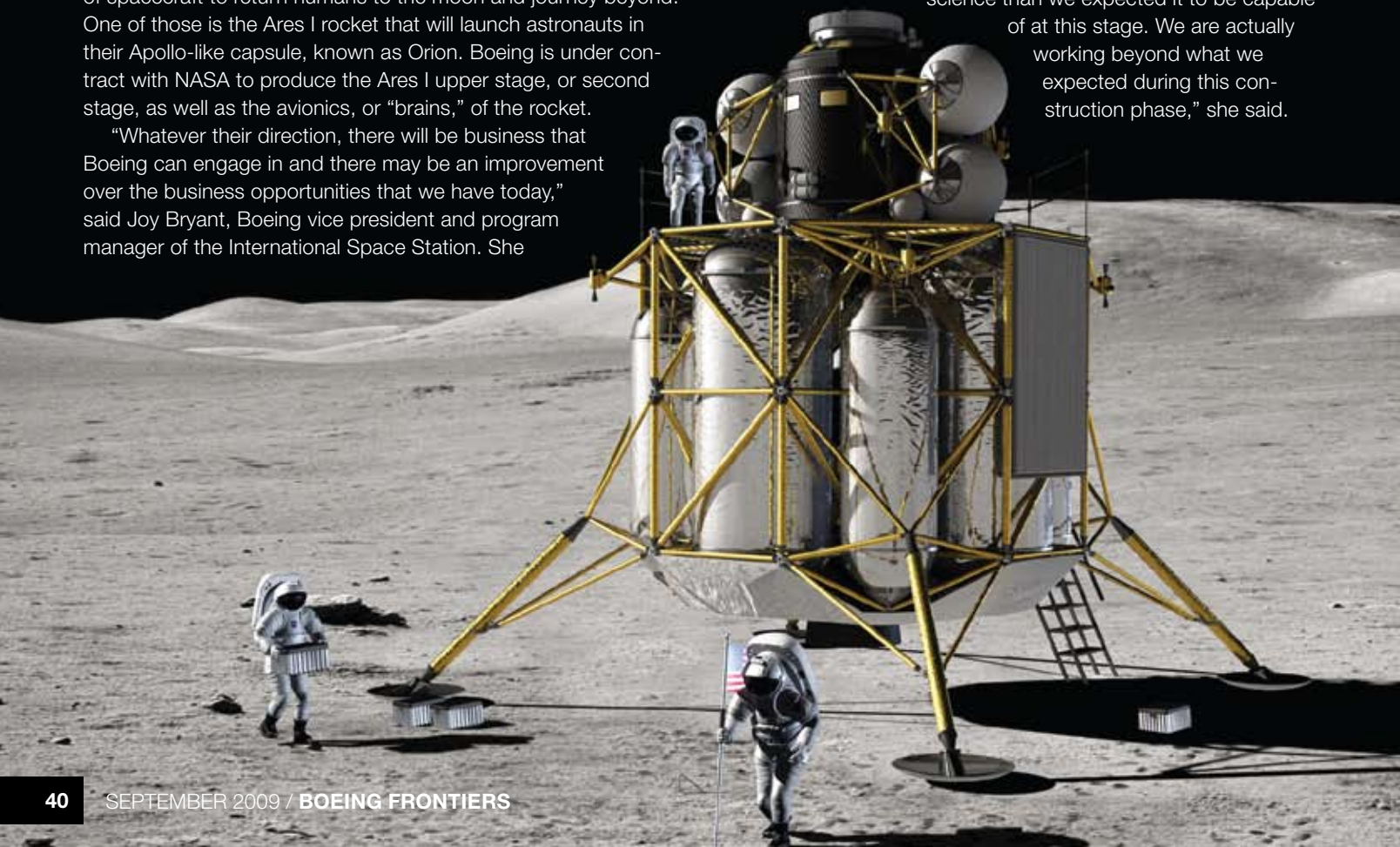
Bryant believes the investment in the station merits keeping it flying past 2016. Current plans call for the station to operate for just six years after its assembly is completed in 2010.

Boeing has just begun a space station life extension study for NASA that would take the station beyond 2016. The study is expected to take about a year to complete. “We built the space station with a certain amount of life and margin. We have to look at the structural integrity of the station and then look at whether it has been exposed to environments we did not expect,” Bryant said.

In addition to looking at the health of the structures and systems to extend the space station's life span to 2028, Bryant said, there is a need to evaluate the logistics chain that supports the station with replacement parts as they wear out and that re-supplies consumables such as oxygen, nitrogen, water and fuel.

The space station is a major engineering and operations success, according to Bryant. She believes that the current science being performed on station will yield significant results in the future. “The International Space Station is providing more

science than we expected it to be capable of at this stage. We are actually working beyond what we expected during this construction phase,” she said.





**“A lot of what we need to do for the lunar mission is applicable to potential Mars missions... You have to get this capability whether you are going to the moon or Mars.”**

— Keith Reiley, Boeing program manager, Altair lunar lander

NASA Administrator Charles Bolden has said the United States wants to go to Mars someday, but a mission to Mars is no easy feat. A crewed mission to the Red Planet is a challenge that will exercise technological capabilities.

“A lot of what we need to do for the lunar mission is applicable to potential Mars missions, such as launch capability, in-space transfers and using Orion for high-speed re-entry from a planetary trajectory. You have to get this capability whether you are going to the moon or Mars,” said Keith Reiley, Boeing’s program manager for the Altair lunar lander—the spacecraft that will actually land astronauts on the moon. NASA had plans to award an Altair design support contract to several companies. Boeing submitted its proposal in February,



but NASA put the contract awards on hold pending the outcome of the review.

Another key concern for future astronauts on a Mars mission is dangerous radiation. Storms of high-energy particles from the sun as well as cosmic rays from deep space could pose hazards. “Mars is a lot more difficult to reach than the moon because the trip will take a lot longer, it takes a lot more mass on orbit to accomplish and radiation protection is a big issue we will need to address.” Reiley said. “Mars has an atmosphere and is more like Earth than the moon is, but the moon is closer and a lot easier to get to.”

As a testbed for Mars, the moon provides the advantage of being only three or four days away. If there is trouble, help can arrive in less time than on the 180-day trip

to Mars. Unlike Mars, the moon has no atmosphere and little gravity, but it is a hostile environment just the same. It can be an ideal training ground for more ambitious journeys to other planets.

Likewise, the International Space Station has proven to be a good teacher about critical technology such as air revitalization and water recycling. Lessons learned on the space station can be applied to other planets. In addition, Boeing’s experience as the station’s prime contractor will be valuable when habitats and new systems are designed to sustain life on distant planets.

Regardless of whether the Obama administration’s decision is to go to the moon or Mars or someplace else, Reiley thinks NASA should be building an infrastructure that allows the nation to go beyond low Earth orbit, where the station and space shuttle currently operate. “I think going to the moon is a good thing, but it should not be our only focus. I am a big fan of opening up more commercial opportunities for businesses. There are a lot of options. We would be excited to work on any one of them with NASA.” ■

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**GRAPHICS: (FAR LEFT)** Astronauts work near the Altair lunar lander on the lunar surface in this NASA artist’s rendering. NASA

**(ABOVE AND LEFT)** A Mars mission is depicted in this artist’s concept. PAT RAWLINGS/BOEING

# The power

## How process improvements also create better environmental and workplace safety performance

By Jennifer Cram

In Long Beach, Calif., mechanics who help assemble the wings of the C-17 transport are saving days of flow time—what took six days to prepare for production now takes only a few hours.

The same kind of success story is playing out in Renton, Wash., where a 737 wing assembly team has improved the production process—while cutting waste and costs.

At both locations, and throughout Boeing, employees are unleashing the power of Lean+ to drive efficiency—and help protect the environment and create a safer workplace. The initiative even has been extended to Boeing’s global suppliers.

“Lean+ is about creating a culture of collaboration and continuous improvement,” said Bill Schnettgoeke, vice president of Boeing’s Lean+ growth and productivity initiative. “Its philosophies, which include waste reduction, resource conservation and competitiveness, are in natural alignment with environmental and workplace safety performance improvements—and will help Boeing achieve its goals.”

As part of its commitment to continual improvement, Boeing is pursuing aggressive five-year environmental and safety targets at its operations. The goal is a 25 percent improvement in energy efficiency, greenhouse gas emissions intensity and recycling rates, as well as hazardous waste reduction, at Boeing’s major manufacturing facilities by 2012. This year, Boeing also launched a companywide effort called Safety Now, which aims to improve workplace safety performance by 25 percent over the next five years.

All employees can play an important role in taking steps to conserve energy, contributing to environmentally progressive aerospace designs, and identifying safer and more efficient work processes. Take, for example, what the Boeing team has done on the C-17 program in Long Beach with the installation of stringers—the structural support stiffeners for wing skin panel assemblies. Mechanics used to remove plastic coverings from each of the 156 stringers per shipset, sort and load the stringers into sawhorses, kit them into lifting straps and finally transport them to several staging areas. It took about six days to complete all of those jobs. Not only was the process time-consuming but there were ergonomic risks associated with the repetitive tasks.

To streamline the process, the C-17 team held what are known as Accelerated Improvement Workshops on the production floor and with stringer supplier Contour Aerospace. Using Lean+, the team developed a streamlined approach and new tooling that significantly reduced setup



**PHOTO:** Boeing Commercial Airplanes Support Center project manager Samantha Reed (standing) plans a Lean+ event with production system consultants Lauren Wood (left), Brent LeBlanc and Tom Kato. GAIL HANUSA/BOEING

**“[Lean+] philosophies... are in natural alignment with environmental and workplace safety performance improvements.”**

– Bill Schnettgoeke, vice president of Boeing’s Lean+ growth and productivity initiative

# of Lean



time and reduced the risk of common injuries. Now, stringers arrive from the supplier in kits for specifically assigned aircraft wing assemblies. Each kit contains stringers pre-loaded into straps, so mechanics can load stringers directly into assembly jigs. The changes eliminated 48 major crane moves and some 27 miles (43 kilometers) of movement by workers performing all the various tasks. Not only was the risk of injury reduced, but so was the potential damage to components.

And the benefit to the environment was huge. “We used to fill four Dumpsters with plastic wrap per shipset,” said John Rainwaters, Department 517 staff analyst. “Now, only one half a Dumpster is filled, reducing waste by over 87 percent.”

In addition to lowering maintenance costs and creating a cleaner work environment, more than 3,200 square feet of floor space (about 300 square meters) was opened for other use by reducing or eliminating so-called “monuments” such as storage racks, said Trevor Whiteside in the Wing Integrated Product Team, Tool Engineering.

“We relied on the experience of a cross-functional team to get us these benefits,” said Linda Sanchez, Department 517 senior manager. “Without their combined knowledge, enthusiasm and skill, we wouldn’t be seeing this much success.”

The C-17 team was recognized for its innovative efforts with several awards, including a 2008 Boeing Silver Eagle Award, a Bronze level award in the California Team Excellence Award competition, and a 2009 International Team Excellence Award Finalist and Attendee Choice Award Certificate of Recognition from the American Society for Quality.

## SLASHING SEALANT WASTE

Like their Boeing colleagues in Long Beach, members of the Commercial Airplanes 737 wing spar team in Renton also held an Accelerated Improvement Workshop to help identify ways to cut waste, according to industrial engineer Brandy Feltes.

Spars are the internal support structure that run through the full length of the wings and provide support for slats and flaps. Mechanics and sealers apply sealant, or “seal,” to the structure to prevent leakage or corrosion. But before applying the seal, sealers must remove the appropriate number of tubes of seal from a freezer and thaw them to a specific temperature. Any leftover seal not used within a given period of time must be discarded as hazardous waste. When employees noticed that up to half of the seal tubes were not fully used before being disposed of, they conducted an Accelerated Improvement Workshop. That led to three key improvements:

- + An employee now makes sure co-workers have the right amount of seal when they need it.
- + A dispensing station was established for brush-coat (or pre-coat) sealant that allows employees to obtain only the amount of seal needed to do their job.
- + A 1-ounce seal tube is now an option, in addition to the existing 3-ounce and 6-ounce tubes, to accommodate jobs that only require a small amount of sealant.

**PHOTO:** Structure mechanic Pete Alvitre loads pre-kitted stringers directly into assembly jigs. The process reduces the risk of injury and the amount of plastic packaging waste, while saving significant flow time. PAUL PINNER/BOEING





“The results were outstanding,” said Chuck Kurzhal, Spars manager and Value Stream Team leader. “We reduced discarded seal tubes from approximately 86 per day to only 20, and lowered seal waste by more than 50 percent” without compromising the quality of the seal applied to the spars.

The changes also helped cut costs. “We used to stock a lot of tubes, and now we’ve been able to reduce not only our consumption but also the inventory we stock in our freezers,” said sealer DeeDee Christensen. “That means we rotate through our seal more quickly, so we always have the freshest material.”

The team is continuing to explore ways to further reduce seal waste, such as creating an even smaller tube size option, and its innovations have been shared with other teams for replication.

### CUTTING ENERGY CONSUMPTION

In addition to saving time, reducing costs and eliminating waste, the Lean+ initiative is also being used to reduce energy consumption. Since 2002, Boeing’s Shared Services Group Conservation Initiative team has conducted 57 Lean Energy Assessment events at Boeing sites across the United States, and has identified potential ways to save enough energy to power some 28,400 homes for one year. Boeing has reduced energy consumption by almost 12 percent during this time, according to Jeff Nunn, SSG Conservation Program manager.

The assessments, conducted over several days by a small team of experts, identify opportunities for improvement. These include retrofitting buildings with more efficient lighting systems, improving heating and air conditioning systems, and having these systems operate when employees are actually in the building. The assessments also identify ways employees can help reduce energy consumption, such as turning off computer monitors, lighting and equipment when not in use.

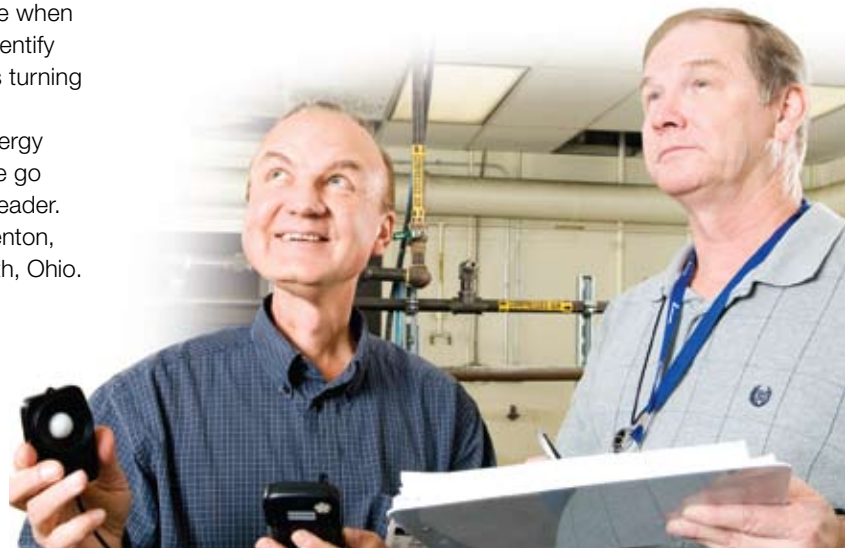
“Lean+ provides a common approach to evaluate a site’s energy consumption and identify ways to reduce it that might otherwise go overlooked,” said John Norris, Lean Energy Assessment team leader.

Earlier this year, assessments were conducted in Houston, Renton, and Huntsville, Ala. An assessment is planned this month in Heath, Ohio.

**“Lean+ provides a common approach to evaluate a site’s energy consumption and identify ways to reduce it.”**

– John Norris, Boeing Lean Energy Assessment team leader

**PHOTOS: (ABOVE)** DeeDee Christensen, a sealer in the 737 spar area at the Commercial Airplanes factory in Renton, Wash., was part of a team that helped reduce sealant waste by 50 percent. **MARIAN LOCKHART/BOEING**  
**(BELOW)** Ed Stefanski (left) of Philips, a Lean Energy Assessment supplier, and John Norris, Boeing Lean Energy Assessment team leader, assess lighting systems for energy and cost savings. **ALAN MARTS/BOEING**



# “Boeing employees are leaders in innovation. Their talent will help us achieve... safer workplaces, improved environmental performance.”

– Mary Armstrong, Boeing vice president, Environment, Health and Safety

## SUPPLIER SOLUTIONS

Boeing’s Lean+ initiative is also helping Boeing suppliers improve their environmental footprint.

This year, Supplier Management developed methods to better measure environmental improvements during Lean+ events. While leaner processes naturally reduce waste and energy use, these benefits had not been consistently documented. By actively measuring these benefits, the actual savings is realized, which in turn helps drive further environmental improvement.

Pilot projects show significant environmental and cost savings. For example, one effort with a supplier resulted in the reduction of more than 14 pounds (6 kilograms) of dunnage (packaging materials such as plastic bags and Bubble Wrap) per box, which will lead to reductions of about 1,100 pounds (500 kilograms) of waste per year. Brent LeBlanc, a production system consultant in Commercial Airplanes, noted the new process also reduced setup time by 12 percent and people travel by 8 percent.

“We’re really excited that Lean+ is such a natural fit with reducing environmental impact,” said Ray Healy, director of the Commercial Airplanes Supplier Management Operations Center. “It directly supports the business and isn’t something extra we have to go do.”

Commercial Airplanes’ Supplier Management team plans to hold about 500 Lean+ events with 58 suppliers next year to help them better measure their environmental footprint and identify and apply reduction opportunities. Those events will include emphasis on reducing packaging and carbon dioxide emissions, primarily from parts transport and energy consumption. The team estimates those efforts could reduce dunnage by up to 10 tons (9 metric tons) and drive significant flow and productivity improvements in the supply chain, said Steve Patneau, senior manager for the Support Center.

“Boeing employees are leaders in innovation,” said Mary Armstrong, vice president of Environment, Health and Safety. “Their talent, pioneering spirit and enthusiasm will help us achieve new levels of performance—resulting in safer workplaces, improved environmental performance and a better future for our company, our employees, our customers and our communities.” ■

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## Get involved in Lean+

You can help improve the safety of your workplace and drive environmental efficiency:

- + Identify process improvement opportunities.
- + Evaluate processes, use Lean+ tools to improve environmental performance and reduce workplace safety and ergonomics risks.
- + Measure results and set improvement goals.
- + Seek and share best practices.

Need more information? Resources and tools include:

### + EHS and Lean+ Integration Course

Training on how to embed environment, health and safety thinking into Lean+ is available on the Boeing intranet at [http://leo.web.boeing.com/ProductService/EHS\\_Course.cfm](http://leo.web.boeing.com/ProductService/EHS_Course.cfm). The course includes checklists to help identify environmental, energy, ergonomics, and safety and health risk factors that exist in the job or process and reduce or eliminate them.

### + Accelerated Improvement Workshops

AIWs are incorporating environmental considerations in addition to traditional metrics such as cycle time, lead time, safety and ergonomics. The updated workshops began in June and have been held in Auburn, Renton and Everett, Wash., and at the Spares Distribution Center in SeaTac, Wash. Full implementation is expected in the coming weeks.

### + Initiatives Database

To find information, best practices and “lessons learned” that promote continuous improvement, employees can search for initiatives-related projects in the Initiatives Database (IDB) on the Boeing intranet at <https://initiatedb.web.boeing.com>. The database facilitates replication of projects that can significantly reduce energy use, ergonomics risks, time and cost. If you have a potential environmental or workplace safety-related success to share, contact your business unit IDB focal listed on the IDB Web site.

To learn more about Lean+, visit <http://leanplus.web.boeing.com/index.cfm> on the Boeing intranet.

# One touch

777 warehouse team works to reduce parts packing materials, increase recycling and improve productivity

By Dawsalee Griffin  
Photos by Gail Hanusa

**W**hat if you could make your work processes easier to follow, cost less, save time and help the environment? Employees from the 777 124W Interiors warehouse team in Everett, Wash., used teamwork and Lean+ tools to do just that with parts packaging.

The team members began with a clear idea of what they wanted: to simplify their processes and reduce the amount of packaging materials on 777 parts. “‘One part, one touch’ is our goal,” said Cindy Steele, team lead. “We wanted to cut down the number of times that parts are handled from the time they are packed by the supplier to when they’re installed on our planes.” The team reasoned that if parts were handled less they would require less packaging, thereby saving time and reducing waste.

The team turned to Lean+ tools to help identify areas for improvement and create a path to the one-touch goal. They held an Accelerated Improvement Workshop, a type of Lean+ event that examines a process to reduce cost and flow time.

It became clear during the workshop that parts were being partially unpacked three times: The outside packaging was removed at receiving, more packaging was removed in the warehouse area, and the final protective packaging was discarded by mechanics before installing the part on the airplane.

As a result of the workshop, the team streamlined the process by stationing a warehouse employee in the receiving area, consolidating most of the packaging removal to one area. Now, parts are unpacked down to the inner protective packaging before they are sent to the warehouse. That change not only saves a process step, it has increased cardboard recycling. The 777 124W warehouse team already recycled cardboard, but now the team fills three 5-foot-by-5-foot recycling bins a day. The team also found a way to begin recycling plastic and now fills two recycling bins a day. Increasing recycling and reducing the amount of material sent to landfills is a priority for Boeing, which committed in 2008 to improve recycling rates by 25 percent over five years.

The team then looked for more ways to reduce parts packaging. One idea was to stage the parts on reusable carts, which would both reduce the need for

**“‘One part, one touch’ is our goal.”**

– Cindy Steele, 777 124W Interiors team lead



# “The reusable packaging makes it easier to inspect and store the parts, and it simplifies our processes.”

– Nancy Coghe, material processor requirements facilitator, 777 124W Interiors warehouse



**PHOTOS: (LEFT)** 777 124W Interiors facilitators Nancy Coghe (left) and Kayla Thorson inspect grilles stored in a reusable shipping case. **(TOP)** Kelly Hinsey (left) and Calvin Kennebrew, 777 124W Interiors facilitators, examine parts stored in a reusable cart. **(MIDDLE)** 777 124W Interiors facilitators Terry Schmidt (left) and Michelle Oliveira place parts in a “blue bag” to reduce packaging. **(ABOVE)** 777 124W Interiors facilitators Cindy Steele (left), Nancy Coghe and Kayla Thorson (kneeling) inspect parts stored on a reusable cart.

handling and packaging as well as protect the parts. The warehouse team brought the concept to the Commercial Airplanes 777 Moonshine Shop, where Jeff Thiessen, tool engineer, created the carts. “I had developed similar carts for another group,” Thiessen said, “so when Cindy approached us, I was able to quickly draft a cart and pallet design I thought would work for her group.” Now, parts are loaded into the carts at the receiving area, stored at the warehouse and issued to the mechanics.

“Our first step, consolidating unpacking and recycling into one main area, was important,” said Roberta “Robin” Layton, a material processor requirements facilitator on the 777 124W Interiors warehouse team. “That freed up floor space, which made it easier to reorganize the warehouse and accommodate the new carts.”

The warehouse team didn’t stop its improvement efforts with that success. The next step was to work with suppliers to further reduce packaging. The team developed reusable packaging for some parts. The new packaging saves time and money for both Boeing and the suppliers and reduces the team’s environmental footprint. Parts require less handling because the reusable carts, cases, totes and bags are not unpacked until they reach the assembly area.

“The reusable packaging makes it easier to inspect and store the parts, and it simplifies our processes,” said Nancy Coghe, material processor requirements facilitator in the 777 124W Interiors warehouse.

Grilles, which are small panels, are a good example. “Grilles used to come in a huge box,” Steele said. “Now they come packed in reusable suitcase-sized cases.”

The cases are packed by the supplier, shipped to Boeing and unpacked by the mechanic who installs the grilles on the 777. With no packaging to discard, the empty cases are returned to the supplier to be refilled and shipped again.

According to Steele, the team continues to look for ways to improve its processes. Meanwhile, word about the improvements already in place is spreading. The team is excited to work with representatives from other organizations who are coming to learn “how we did it,” Steele said.

Coghe and Steele have some advice for teams that might hesitate to propose changes. “No one knows your process better than you do,” Coghe said. “You are the ones who can see whether there’s a better way to do what you do.”

“Empower yourself,” Steele added. “You can make a difference to your area and to Boeing.” ■

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# 10,000 and climbing

Total Seattle single-aisle commercial jet production passes 5-digit mark

By Michael Lombardi

A production run of 10,000 airplanes is one of the most notable milestones in aviation history, and on Aug. 4, Boeing Commercial Airplanes achieved this when a Southwest Airlines Next-Generation 737-700 was celebrated as the 10,000th Boeing single-aisle commercial jet to be built in the Seattle area.

The milestone is a rare feat today, but it was somewhat more common during World War II when Boeing, Douglas Aircraft and North American Aviation accomplished amazing production numbers while building aircraft for the “Arsenal of Democracy.” In Wichita, Kan., Boeing built more than 10,000 “Stearman” Kaydet primary trainers. Boeing, Douglas and Lockheed-Vega teamed up to build more than 10,000 B-17 Flying Fortresses. Douglas Aircraft built more than 10,000 C-47s (military variant of the DC-3), and North American Aviation, at its Inglewood, Calif., and Dallas plants, produced more than 13,000 T-6/SNJ Texan trainers as well as more than 15,000 of the P-51 Mustang fighter.

More recently, airplane production runs are limited and it takes a family of similar airplanes to reach the 10,000 milestone. The Commercial Airplanes 10,000 milestone began in October 1958 when the first 707 was rolled out at the Renton, Wash., site. It was followed by an unmatched production run of single-aisle commercial jets.



**PHOTO:** The 10,000th Seattle-built Boeing single-aisle commercial jet, a Southwest Airlines Next-Generation 737-700, takes off from Boeing Field. JIM ANDERSON/BOEING

## Seattle-built single-aisle commercial jets

707/720s	727s	737s	757s
1,010	1,832	6,108	1,050

The Boeing total is even more impressive with the addition of nearly 3,000 single-aisle jets built in Long Beach, Calif., by Boeing heritage company Douglas and McDonnell Douglas.





And the run continues as a Next-Generation 737 is added to the total every day. In fact, the Boeing total for single-aisle commercial jets is even more impressive with the addition of Boeing heritage company Douglas and the legendary Douglas Commercial “DC” jets built in Long Beach, Calif. Single-aisle jets built by Douglas/McDonnell Douglas include 556 DC-8s, 976 DC-9s, 1,191 MD-80s, 116 MD-90s and topped off with 156 MD-95s that were renamed the Boeing 717-200 after McDonnell Douglas and Boeing merged in 1997.

All but the Douglas/McDonnell Douglas planes were built at the Renton site with the exception of the initial production of 271 737s, which were built at Boeing Field. To this list the Renton factory can add a production run of 732 military C/KC-135s, 878 C/KC-97s, 1,129 B-29As, 24 TB-50Hs, the lone XPBB-1 Ranger and, of course, the Dash 80, prototype for the 707 and KC-135. These make the Renton site not only the world’s most productive site for single-aisle commercial jets but also one of the largest producers of large multi-engine airplanes in history. ■

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**PHOTOS: (TOP)** The first major milestone for Boeing commercial jets, which were all single-aisle at the time, was reached on June 5, 1967, when Boeing delivered No. 1,000, a 707-320, to American Airlines. Then–Boeing President William Allen (at the lectern) presided over the delivery ceremony. **BOEING ARCHIVES**

**(ABOVE)** Previously, only wartime aircraft production lines reached the five-digit mark. Here, Boeing employees sign their names to the 10,000th Kaydet trainer built by Boeing in Wichita, Kan., during World War II. **BOEING ARCHIVES**

# Real-time recognition

New kits help managers instantly reward outstanding performance

By Wilson Chow

Photos by Gail Hanusa/Boeing

**W**hether it's helping an airline configure its airplane or helping out with airplane deliveries, the Customer Engineering team in Commercial Airplanes is up for the challenge. Indeed, the team is accustomed to expediently handling engineering requests from airline customers and solving related problems.

The team recently took on an issue that had little to do with customers or engineering: making it easier to recognize fellow team members for their accomplishments.

The best way to recognize an employee is to be specific and timely, according to Alisoun Lamb, Customer Engineering staff analyst, who adds that recognizing positive behaviors can encourage employees and make a team more successful.

"We wanted to find a way to make Pride@Boeing recognition more instant," Lamb said.

**"A 'thank you' is great, but giving or getting something over and above that is even better."**

*– Pete Olson, account manager, Customer Engineering, Commercial Airplanes*



**PHOTO:** The creators of the Customer Engineering manager's instant recognition kit, Ruth Weeda (left), Karen Myers and Alisoun Lamb, won the Most Widely Adopted Improvement award at the Commercial Airplanes Airplane System Lean Fest in June.



As a Pride@Boeing recognition focal, “I knew we had to do something to make our current recognition more successful, something managers could have at their fingertips for a quick and easy way to instantly recognize employees,” said Karen Myers, executive office administrator, Customer Engineering.

Myers, Lamb and a colleague, Ruth Weeda, a Customer Engineering configuration management specialist, set out to develop an instant recognition kit that managers could carry with them. The portable kits are intended to help foster a culture within Customer Engineering where managers and even employees are encouraged to recognize one another for their contributions to the team.

Myers, Lamb and Weeda believed that managers would use instant recognition more if recognition items were easier to access.

“We had seen other recognition kits that were bulky, and we knew our managers wouldn’t use them,” Lamb said. “What’s the point of having the kits if they just sit on desks? We thought, what is it that managers could easily use and would carry with them to meetings?”

Weeda said the idea finally clicked after the trio saw some notebook organizers, which people carry with them to take notes, keep track of appointments and other information.

### AN IDEA COMES TOGETHER

The team used a notebook organizer to build a prototype of an instant recognition kit. The result? A notebook organizer that managers can use to accomplish their daily tasks—since each has space for a cell phone and paperwork, and contains a notepad. But these organizers also incorporate common instant recognition items—such as gift cards for the Boeing Store, cafeteria tokens and movie tickets (the selection of items vary among sites)—and a card for managers to record which item each employee prefers. Recognition focals help managers refill empty kits.

Since the kits have been distributed, managers have been quick to use them, Lamb said.

Derek Fialho, an account manager in Customer Engineering, said although he already gets satisfaction from his daily work, “it helps to have little incentives.” Fellow account manager Pete Olson agreed. “A ‘thank you’ is great, but giving or getting something over and above that is even better.”

While employees are formally recognized for significant accomplishments, managers use the instant recognition notebooks to help them be more effective leaders and build stronger connections with their teams.

“This is one of the simplest and most practical methods anyone could use to send the message ‘I care about you,’ at the right time and place,” said Ali Shami, Customer Engineering regional manager for Europe, Russia and Central Asia and leasing programs. “The recognition notebook is a great tool to encourage more instant recognition.”

### AN IDEA DISCOVERED

The kits were first introduced in Customer Engineering in late 2007, and since then, other organizations across Boeing have adopted the idea, including groups in the Puget Sound region, Long Beach, Calif., Colorado and St. Louis.

“We’re getting requests left and right to find out how it works and how they can do it,” Lamb said.

It’s difficult to estimate just how many instant recognition kits are now in use, but the team at Commercial Airplanes Customer Engineering knows they can affect the work environment positively and help build morale.

“People like to feel appreciated and recognized,” Myers said. “There is a lot more instant recognition going on now than there used to be.” ■

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## Everything needed to say: ‘Good job’



Recognition kits have been distributed to managers in Commercial Airplanes Customer Engineering to help them when it comes time to single out fellow team members for accomplishments. Here’s what you need to build a manager’s instant recognition kit:

- Three-ring, 8.5-by-11-inch notebook organizer
- Clear business card pages
- Zippered pouches
- Inventory checklist
- Employee preference card
- Information sheet on reasons to recognize and tips on effective recognition
- Various instant recognition items (selection varies by site), such as:
  - Boeing Store gift cards
  - Movie tickets
  - Massage certificates
  - Cafeteria tokens
  - Vouchers (to allow for redemption of larger items)



# BCC 101

## Course helps explain airplane financing

By John Kvasnosky

If home refinancing in today's tumultuous economic environment is challenging, imagine what it's like to borrow tens of millions of dollars to purchase new Boeing airplanes. Since a customer's ability to pay at delivery is key to Boeing's business cycle, it helps when employees know more about the inner workings of aircraft financing.

Welcome to the adventurous world of BCC 101. This three-hour overview course is a journey into the fundamentals of the airplane financing business. Some of the travelers are new employees at Boeing Capital Corp., the company's financing unit. But increasingly, many are from other functions that touch airplane sales and production as well as from business units looking to better understand how financing happens.

Since BCC launched the program in 2002, the primary guide has been Doug Hadley. He is a BCC financing director responsible for customer accounts in several European countries and Turkey and, before joining the company 12 years ago, a longtime commercial banker.

"We started as primarily a new-employee orientation program. We thought it would be worthwhile to help people who normally wouldn't have access to the customer contact parts of the job to understand what we do," Hadley said.

Today, a typical BCC 101 session is a full house comprising BCC employees; sales, contracts and marketing staff from Commercial Airplanes; Finance employees from across the enterprise; rotational employees; and, increasingly, non-finance employees wanting a better understanding of the financing process.

"We start with the basic tools in our aircraft financing kit. We talk about operating leases, bank loans, and senior debt and junior debt. We discuss export credit support for financing, and the capital markets. From there, we go into more detail based on the interest of the group," Hadley said. Often he is joined by BCC subject-matter experts who share in the presentations.

The banker turned teacher said the current economic disruption has a lot to do with employees' interest in the subjects covered in BCC 101.



**"All of a sudden, you can see the lights come on and the understanding on a person's face that says, 'Oh, I get it.'"**

— Doug Hadley, Boeing Capital Corp. finance director

"People have a lot of uncertainty about what's going on in the current financial environment. So we talk about the world of aircraft finance—the players and who's active and who's not. I work to help people understand it's a cyclical business, and hopefully we're in the bottom of the cycle," Hadley said.

He also works to help overcome the quizzical looks that can accompany the non-finance employees' introduction to the realm of aircraft financing.

"I try to equate what we do to what's involved in getting a home mortgage. There are a lot of similarities to what we do day to day in our personal financing and how airplanes get financed," he said.

And like any dedicated teacher, Hadley revels when he connects with his students. "All of a sudden, you can see the

“I thought the complicated factory operation that builds planes and flies them out of the factory is all that Boeing is about, right? This class stretched my mind and made me appreciate how much effort is actually required behind the scenes.”

– Kaifu “Denis” Lam, industrial engineer, 787 Final Assembly

lights come on and the understanding on a person’s face that says, ‘Oh, I get it.’”

Judging from comments of employees taking the financing class, those “aha” moments are appreciated.

“I stayed engaged through the whole class. It was fascinating to learn about aircraft financing, especially in the current economic environment, and how BCC fits into The Boeing Company. The knowledge I gained will definitely contribute to my career development,” said Anna Kriyajeva, a Finance employee who served a BCC rotation.

Cheryl Hart, an analyst in Commercial Airplanes Group Finance, was another who saw the pieces come together. “I left with an understanding of how we work together with internal and external customers, what market indicators to watch, such as air cargo, how various leases are structured, and the importance of beginning the Export-Import Bank application as early as possible.”

BCC employees often take the class more than once. “Doug’s class always contains the latest information, so even for BCC veterans it keeps you up to date on what’s happening,” said Hank Koster, a BCC credit analyst.

For Hadley and his BCC colleagues, the return on investment comes when employees make the connection to what they do every day.

“It brought me a whole new perspective of how Boeing operates,” said Kaifu “Denis” Lam, an industrial engineer in 787 Final Assembly. “I thought the complicated factory operation that builds planes and flies them out of the factory is all that Boeing is about, right? This

class stretched my mind and made me appreciate how much effort is actually required behind the scenes.”

“It’s one thing to sell an airplane. It’s another to make sure the money’s there on the day of delivery,” Hadley said. “I want people to understand that we don’t sit back and let things happen. We take a very active position in getting airplanes financed.”

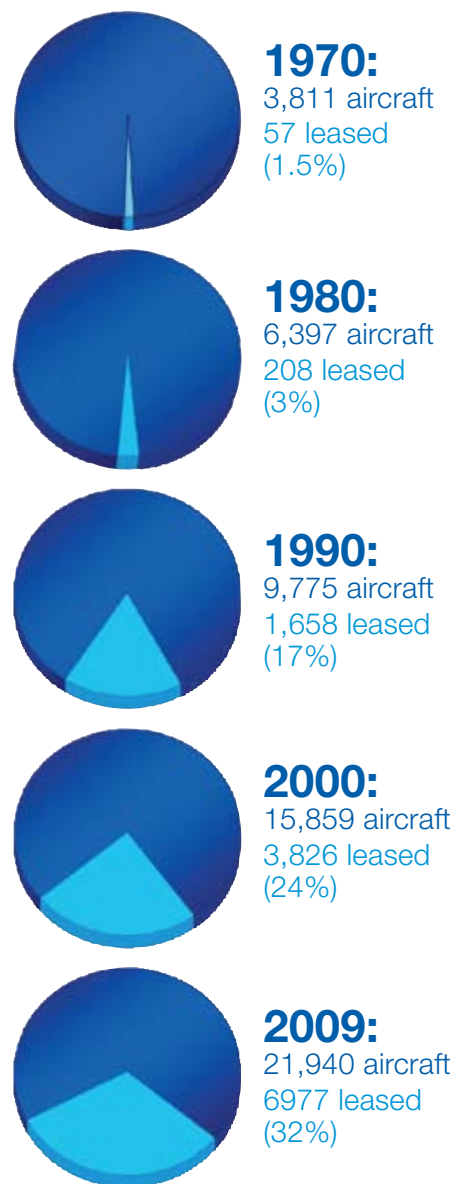
Employees who are interested in participating in “BCC 101: Aircraft Financing Overview” (TR 067874) must have management approval and contact the instructor directly. It is only offered as a live course at this time. ■

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**PHOTO: (LEFT)** Boeing Capital Corp. Aircraft Financial Services Finance Director Doug Hadley walks attendees through aircraft financing at a recent BCC 101 session. The three-hour overview is held at the financing unit’s Renton, Wash., headquarters. **MARIAN LOCKHART/BOEING**

**GRAPHIC: (RIGHT)** Among topics explored in BCC 101 is the growing trend among airlines to lease a greater portion of their fleets as opposed to owning the aircraft. **BOEING**

## World Airline Fleet: 1970 to 2009\*



\*Airclaims through 7/14/09

## Boeing Company – BA

NYSE: Industrials/Aerospace & Defense

As of 8/21/09

# \$45.87

### Stock snapshot

52-week range:

52-week high **\$68.47**

52-week low **\$29.05**

### International competitors

EADS\* – EAD.PA

As of 8/21/09 **€13.53**

52-week range:

52-week high **€16.69**

52-week low **€8.12**

\*Prices in euros

### U.S. stock indexes

S&P 500

As of 8/21/09 **1,009.06**

52-week range:

52-week high **1,303.04**

52-week low **666.79**

S&P 500 Aerospace and Defense Index

As of 8/21/09 **285.47**

52-week range:

52-week high **392.25**

52-week low **194.13**

Dow Jones Industrials

As of 8/21/09 **9,347.86**

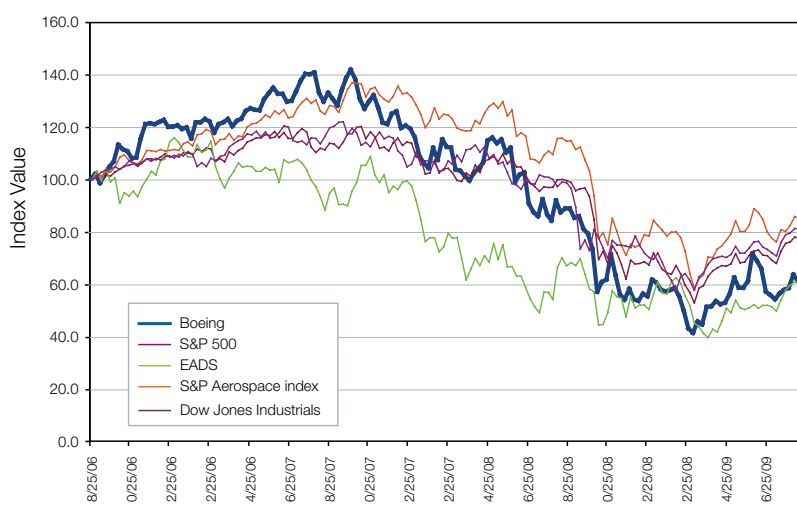
52-week range:

52-week high **11,831.30**

52-week low **6,440.08**

### Stock price chart

The chart below shows the stock price of Boeing compared with other aerospace companies, the S&P 500 index, the S&P 500 Aerospace and Defense Index, and the Dow Jones Industrials. Prices/values are plotted as an index number. The base date for these prices/values is August 25, 2006, which generates three years of data. The prices/values on that date equal 100. In other words, an index of 120 represents a 20 percent improvement over the price/value on the base date. Each data point represents the end of a trading week.



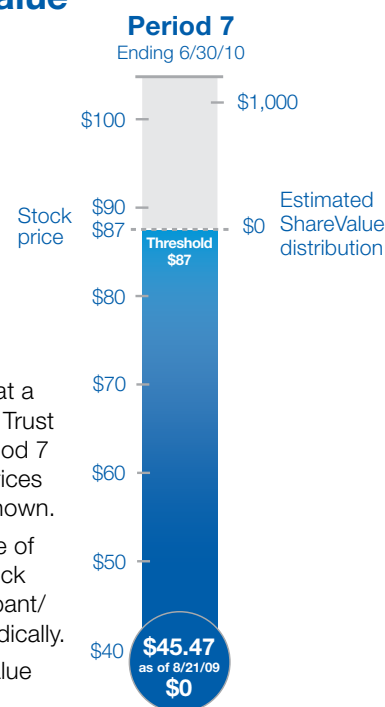
### Boeing stock, ShareValue Trust performance

ShareValue Trust is an employee incentive plan that allows eligible employees to share in the results of their efforts to increase shareholder value over the long term.

The program—which runs for 14 years and ends in 2010—features seven overlapping investment periods. The program is currently in Period 7.

This graph shows an estimate of what a “full 4-year participation” ShareValue Trust distribution (pretax) would be for Period 7 if the end-of-period average share prices were the same as the recent price shown.

The share price shown is the average of the day’s high and low New York Stock Exchange prices. Updates to participant/employment data will be made periodically. For more information on the ShareValue Trust, visit [www.boeing.com/share](http://www.boeing.com/share).



## SERVICE AWARDS: Boeing recognizes the following employees in September for their years of service.

### 50 years

Donald Hall

### 45 years

Lester Beer  
Kenneth Fears  
Richard Kauffman  
Robert Moore  
Johannes Morgenstern  
Curtis Nichols  
Earl Nishiyama  
Charles Rohrbacher  
Charles Simpson  
James Urnes

### 40 years

Gary Affleck  
Palmer Avery  
Eddie Banks  
Mckinley Blow  
Linda Caywood  
Terry Cockrill  
Michael Darnold  
Micheal Dennis  
Roger Edwards  
Waymond Favors  
Henry Foster  
William Gander  
Helga Griesbeck  
Conrad Kirby  
Marion Lawber  
James McBride  
Timothy McGann  
Gary Ottman  
Stuart Pennington  
Susan Pollard  
Virgil Roberts  
Ronald Robinson  
Ronald Scott  
Louis Silverthorn  
Charles Thornton  
Linda Weaver  
Billy White  
Curtis Williams

### 35 years

Mark Allen  
Sam Amira  
Steven Ankenman  
Steven Arnold  
Michael Bernabe  
Bobby Bonds  
Larry Booker  
Irene Bordere  
Richard Brady  
Jay Broad  
Jerry Brower  
Lorrie Bryant  
Gary Burgard  
Daniel Burton  
William Capron  
Richard Chapman  
Raymond Charleston

Lynn Cogger  
Christine Conley  
Steven Dember  
Nancy Edmondson  
Joyce Finch  
Thomas Fischer  
Bettye Frazier  
Rafael Garcia  
Ronald Gardner  
Steven Geffre  
Gary Gregory  
Mark Hagstrom  
Richard Hollis  
William Holroyd  
David Hong  
David Horton  
John Klein  
Mervin Langland  
Thomas Lind  
Margaret Lindeman  
Joseph Manke  
Donald Mason  
William Matheny  
John McClees  
Leslie Music  
Ervin Nelson  
Edwin Nilsen  
Evelyn Nishimura  
Linda Nishimura  
Robert Okita  
Jo Parker  
Roger Parry  
Gerald Peterson  
Craig Pitts  
Daniel Podgurski  
Fernando Ramos  
Elmer Range  
Andy Rebulio  
Delia Ruiz  
Michael Ryan  
Scott Scherer  
Floyd Schmitz  
Larry Seagraves  
Gary Seetoo  
Lavern Shelp  
William Shivitz  
Laurie Siedentopf  
Michael Simonson  
Richard Skurat  
Timothy Stickel  
Richard Sundell  
Nancy Swanson  
Starr Tavenner  
David Taylor  
Lawrence Terrigno  
Christine Tesson  
Charles Thorp  
James Velez  
William Voehl  
Christelle Westerberg  
Robert Williams  
Keith Zeisel

### 30 years

Neil Aaron  
Sandra Ables

David Agnew  
James Alberico  
Mir Ali  
Timothy Allen  
Rhonda Allred  
Kay Ames  
John Anderson  
Susan Anderson  
Robert Arnoneit  
Claude Asher  
Raymond Atkins  
Brian Bagby  
Grace Bahandari  
Michael Bair  
James Baker  
Jay Bakewell  
Franklin Barnett  
Arrington Barrett  
Peter Bartnick  
Elmer Barton  
Charles Bates  
Farzad Bayat  
Danny Bays  
Larry Beaman  
Philip Beck  
Paul Becker  
Gary Beilsmith  
Ted Berger  
Bryan Bezljaj  
Gurjit Bhargoo  
Grace Blackwater  
Carol Bogh  
Frances Boulay  
Robert Bourdeau  
Gary Bovey  
Susan Bowden  
Richard Brakeman  
David Briske  
Edward Brock  
Victoria Brown  
William Brown  
Steven Bruner  
William Burggraf  
Susan Burnett  
Charles Burton  
Debra Buss  
Donna Byars  
Mary-Ann Carlson  
Kathy Carr  
Michael Cebollero  
Joseph Chang  
Donald Chippeaux  
Steven Chodos  
Lori Clark  
Joseph Cleary  
Robert Cohen  
Dallas Colton  
Steven Conrad  
Jill Copelin  
Gary Corbry  
Alfred Correa  
Mark Costa  
Arthur Costain  
Gary Culler  
Gerald Currie  
Timothy Dasho

Maria De Jesus  
George Deal  
Linda Dean  
Barry Delfel  
Anthony Devitis  
Edward Dietz  
Michele Diggs  
Eduardo Digon  
Calvin Doss  
Cynthia Downing  
Charles Drdla  
Bruce Drolen  
Patrick Ducken  
Terry Duke  
Robert Dunning  
Rickey Erickson  
Ronald Esther  
Jacquelyn Faucher  
Reginald Figard  
Gerard Figurelli  
Bruce Flothe  
Scott Floyd  
Kurt Foley  
Robert Foreman  
Tookie Forsyth  
Mary Fowler-Taggart  
Barbara Fox  
Michael Frankie  
Linda Fritch  
Lawrence Gaines  
Johnny George  
Paul Gettys  
Mary Ghan  
Mary Gilliam  
Jack Gilliland  
Kenneth Gladding  
Paul Gleiberman  
James Graham  
Michael Grauburger  
Laura Green  
Kathleen Greifzu  
Laura Grigsby  
Thomas Grissett  
Gloria Grossheim  
Michael Guldenmann  
Tina Haddock  
Harvey Hailer  
Christopher Hall  
David Hamilton  
Mark Hansen  
Rodney Hanson  
Michael Harris  
James Harrison  
Glennon Hartog  
Glenda Hatcher  
Jesse Hatfield  
Jeffrey Haubrich  
Dawn Hawthorne  
Cheryl Hay  
Scott Haynes  
Marilyn Helvy  
Terry Hemphill  
Marvin Hepola  
Susan Herman  
Carol-Sue Hipshier  
Michael Hodge

Kenneth Hodo  
Stephanie Hoff  
Frank Holman  
David Ingebright  
James Inman  
Loretta Ivey  
Jeffrey James  
Gary Jennings  
Gary Johannigmeier  
Eugene John  
Brenda Johnson  
John Johnson  
Larry Johnson  
Marti Johnson  
Richard Johnson  
Andrew Jones  
Joann Jordan  
Chaiyong Juntara  
Katherine Kaufman  
Randy Keiper  
Michael Kelley  
Kevin Kelly  
Stewart King  
Leonard Kirschner  
Donald Kosai  
Larry Kraft  
Kirk Kubec  
Richard Kulesha  
Dennis Lamb  
Willard Laugle  
Ernest Lee  
Paul Levitt  
Michael Little  
Robert Lockwood  
Samuel Lopez  
Falyssia Lowe  
Scott Lyon  
Joan Malone  
Kim Mansini  
Scott Marelli  
Susan Matel  
David Matthews  
William May  
Cheryl Maynard  
Ronell McCraw  
Joseph McCann  
John McCormick  
Michael McGrady  
Donald McKelvie  
Dale McLean  
Rory McLean  
Sharon Mendez  
David Merriman  
Calvin Meske  
Ross Messinger  
Michael Mette  
Carol Meyer  
Michael Micotto  
Donald Mills  
Robin Millus  
Robert Moore  
Bradford Moravec  
Larry Morgan  
John Mosbacher  
Dana Mozena  
Wade Murphy

Kay Murray  
Armida Nava  
Samuel Nicomedes  
Steven Nilsson  
Michael Notarangelo  
Brian Nutter  
Bruce Obermeyer  
Tad Olafson  
Linda Oliver  
Keith Olsen  
Curtis Olson  
Steven Olson  
John O'Malley  
Michael O'Malley  
Jonathan Ost  
Randall Owen  
Gerry Owens  
James Pace  
Myong Pae  
Jerald Palmer  
Terry Patton  
Stephen Perrera  
Catherine Petramalo  
Robert Pierce  
Patricia Pollard  
Kevin Powell  
Michael Pratt  
Richard Prehn  
Michael Prellwitz  
Elizabeth Prichard  
Rush Queen  
Dennis Quinn  
Julie Radle  
Latif Rahimane  
Gloria Raquel  
Kathleen Ray  
Ruth Ray  
Robert Read  
Gregory Reed  
Richard Reeder  
Steven Reinhard  
Bruce Reynolds  
Carol Rhee  
Tina Ricco  
Michael Ricroft  
Kevin Riley  
George Robbins  
Terry Robertson  
James Rome  
Arturo Rosales  
Michael Ross  
William Roulette  
Cindra Rowland  
John Rozsonits  
Delores Rush  
Michael Sackawicz  
Kondala Saripalli  
Norman Savage  
Marwan Sayegh  
William Schallert  
Clyde Schock  
Patricia Schomburg  
John Senkiw  
Maryann Shepard  
Barton Shilcock  
Charles Simmons

# Milestones

Leland Singer  
Paula Small  
Philip Smereczniak  
Calvin Smith  
Cheryl Snell  
Helen Somera  
Katherine Soto  
Mary Speigelhalter  
Todd Stansbury  
Christine Stanton  
Donna Sterbinsky  
Anthony Stewart  
Evangeline Stewart  
Richard Strike  
Gwen Sugita  
John Sulser  
Stephen Swann  
Craig Swanson  
Laverne Swanson  
Robert Tager  
Bruce Taylor  
Edward Tebo  
Paul Thieben  
Jennifer Thomas  
Lewis Thomson  
David Thurmond  
Chris Tozer  
Tadeusz Trela  
Connie Troupe  
Terry Trussell  
Terry Turnbough  
George Uffenorde  
Josielyn Ugalde  
Kanji Vagadia  
Karen Vallejos  
Marshall Van Dunk  
Charlene Vander  
Pluym  
Stephan Vassale  
Leon Wahlin  
Stephanie Ward  
Donald Watts  
John Weber  
Danny Welsh  
Sam Wen  
Randy Wesley  
Kathleen Wileman  
Ronald Wiley  
Brett Williams  
Carol Williams  
Bill Williamson  
Dean Wilson  
Tom Winde  
Vincent Wong  
Bobby Wood  
Chris Wood  
Elizabeth Woolheater  
Rodney Wyatt  
Martin Yagi  
Vivian Yee  
David Young  
Sharol Young  
Daniel Zusan  
Erica Zvetkoff  
Budimir Zvolanek

## 25 years

Steven Abberger

Carolyn Abeel  
George Alcivar  
Gary Alexander  
Rodolfo Alfonso  
Alan Anderson  
Michael Anderson  
Mary Armstrong  
Janice Artim  
Nancy Atwood  
Thomas Augustine  
Lynn Baker  
Trung Banh  
Janet Bankhead  
David Barker  
John Barnett  
Jerry Barnhardt  
Kevin Barrett  
James Bava  
Jane Becker  
Regina Becque  
Irish Benefield  
Michael Benoff  
Robert Berghuis  
David Bethay  
Milton Boomsma  
Steven Bork  
Suzanne  
    Borrego-Serrao  
Jeanne Boschert  
Michael Bostwick  
Eric Boykin  
Kevin Boysen  
Mike Braschak  
Ronald Brevig  
William Breyer  
Arbie Brown  
Dewayne Bryant  
Eric Bubel  
Scott Bui  
Mark Bumgardner  
Margaret Burdeno  
Kenneth Burgess  
Rodney Burr  
Norberto Cabrera  
James Caldwell  
Roy Cannon  
Stephen Carter  
David Cary  
Joe Castillo  
Carolyn Cates  
Beverly Chambers  
Ian Chang  
Darren Chase  
George Clark  
Jack Coleman  
Lathan Collins  
Janyce Conwell  
David Coss  
Herundina Cruz  
Richard Dalluge  
Patrick Damron  
Hung Dao  
James Darling  
Ronald Dayton  
Steven Deem  
William Denton  
Yousef Derakhshan  
Patricia Diambri  
David Dickerson

Daniel Doan  
Franklin Dobkins  
Gary Doerr  
Janet Doll  
James Donaldson  
Mark Douglass  
Lisa Dowdle  
Joseph Dulisse  
Michael Dummer  
Christopher Duncan  
Gary Eaton  
Teresa Eble  
Chris Edwards  
Richard Eide  
Matthew Elliott  
Steven Estes  
C.L. Fagan  
James Fant  
Lisa Farino  
Arthur Faupel  
Louis Feliciano  
Arthur Fernandez  
Westley Field  
Scott Fitterer  
Conry Fletcher  
David Followell  
Mauricio Fonseca  
Mary Forbes  
Roger Forrest  
Mary Forrest-  
    Woodward  
Paul Frank  
Clinton Fraser  
Douglas Fraser  
Robert Freeman  
Mark Fucci  
Linda Furney  
Helen Galvan  
Russell Garner  
Steven Garvich  
Jack Gehrin  
Jacqueline Geise  
Mary Gentry  
Harry George  
James Gerheim  
Gary Gershzhohn  
Michael Gill  
Scott Gilyeat  
Robert Ginter  
Joseph Gleason  
Kevin Gobel  
Christopher Goin  
Judie Goldstein  
Daniel Graham  
David Grant  
Ian Gray  
Dennis Green  
Franck Green  
Michael Green  
Robert Green  
Andrew Grover  
Barbara Guehne  
William Guilles  
Tony Gulley  
Dennis Gurley  
Dennis Guthals  
Robert Hagan  
David Hagman  
Christian Hanreiter

Douglas Hansen  
Gregory Hansen  
Debra Haque  
Craig Harmke  
Jeffrey Harris  
Gail Hart  
David Hartline  
Daune Hashimoto  
Carl Heckett  
Thomas Hennen  
Julie Herberholt  
Richard Heye  
Harry Hill  
Justin Hill  
Peter Hoffman  
Russell Hoggatt  
David Hohenhaus  
Jeffrey Homfeldt  
Shannon Hoveland  
Robert Huff  
William Hutchinson  
Yutaka Ikeda  
Larry Jacobs  
Ralph Jacobsen  
David Jay  
Donald Jennings  
Anita Johnson  
Janice Johnson  
Mark Johnson  
Barbara Jolly  
Darrel Jone  
Portia Jones  
Michael Jordan  
John Judge  
Guy Julius  
William Juniewicz  
Daniel Kane  
Daniel Kelley  
Bruce Kercher  
Jeffery Klaetsch  
Kenneth Knoll  
Lisa Konishi  
Marek Kosciuk  
Jon Krocker  
Ron Lacey  
Glenn Lampert  
Marcus Langenegger  
Dennis LaVoy  
William Lederer  
Kwok-Lun Lee  
Kris Lehmann  
Scott Leroux  
Clinton Lewis  
Richard Lomax  
Anthony Lombardo  
Lori London  
Stephen Lott  
James Luby  
Kenneth Lucero  
James Lusebrink  
Richard Lytle  
Paul Maag  
Mike Maclean  
Vicki MacMath  
Gary Magdalik  
Glenn Marse  
Richard Martin  
Catherine Martinez  
Dennis Mathis

Mark Mathis  
Robert Maxey  
Randall McBean  
Michael McInnis  
Janet McKim  
Ellen McSorley  
Kathleen Medley  
Jere Meserole  
Carolyn Meyers  
John Miller  
David Mize  
Andrew Modin  
Terry Moore  
Michael Moran  
Jeffrey Morgan  
John Moulton  
Richard Murray  
Raymond Muser  
Nancy Nakaji  
Lawrence Nauden  
Roberto Navarro  
Windell Neely  
Donald Neill  
Paul Nguyen  
Ana Nunes  
William Nyenhuus  
Kevin Ober  
Robert Obergfell  
Herbert Oke  
Douglas Olson  
Gary Olson  
Grady Olson  
John Orr  
David Osborne  
Steven Overland  
Stephen Owen  
Jay Palma  
Mark Pantone  
William Park  
Michael Parr  
Pamela Pavlos  
Sanford Pearl  
Don Pendleton  
David Perry  
Richard Petersen  
Sherry Pietras  
Ronald Poland  
Steven Pomeroy  
Stan Posavec  
Robert Powell  
James Purtle  
Michael Qualls  
Deborah Radasch  
Raymond Rademeyer  
Randall Ralph  
Thomas Rausch  
Richard Read  
Thomas Reuland  
Nancy Reynolds  
Fred Rice  
Scott Rich  
Robert Riley  
John Roberts  
Eric Root  
Frederick Roth  
Paul Rozman  
Mark Rubadue  
Linda Rudland  
Sandra Rufkahr

Robert Rumrill  
Paul Russell  
Margaret Ryan  
Richard Sandate  
Bonnie Sandsmark  
Michael Savage  
John Sawaya  
Scott Schaumburg  
Carl Schindler  
Gary Sexton  
Theresa Sheehan  
Scott Shelton  
Russell Sherrie  
Harry Shinnen  
Dale Shull  
Kathleen Simeona  
John Simpson  
Barbara Smith  
Nancy Smith  
Matthew Smith  
Craig Spada  
Sharon Stacy  
Timothy Steed  
Beverly Steed  
John Steele  
Charles Steeves  
Curtis Stello  
John Storm  
Charles Stratford  
Ole Stuvick  
Peter Suk  
George Taylor  
Randall Taylor  
Sabrina Taylor  
Craig Thomas  
Gary Thomas  
Leeand Thomas  
Susan Thomure  
George Thorp  
David Thrasher  
Timothy Tieber  
David Tomomatsu  
Mark Torretta  
John Tougas  
Charles Treadway  
Richard Trujillo  
Nemecio Valiente  
Donald Van Gels  
Leon Vanwoerkom  
Loran Venzant  
Michael Volz  
Menh Vuong  
Dale Waldo  
Eva Walker  
Mark Walker  
Keith Walkup  
Brian Walsh  
David Walter  
Bobby Washington  
Diana Watson  
Rodney Watts  
Brian Weber  
Mark Weinzierl  
Margaret White  
Richard Williams  
Janice Woo  
Warren Yasutake  
Ward Yukawa



## RETIREMENTS: The following employees retired in July from The Boeing Company.

Colleen Abbott, 33 years  
 Catherine Allen, 31 years  
 Joseph Alonso, 23 years  
 Steven Andal, 22 years  
 Carol Andress, 23 years  
 Linda Armantrout, 26 years  
 Dennis Baggett, 30 years  
 Harold Baisden, 7 years  
 Donald Baker, 42 years  
 Kenneth Baldwin, 27 years  
 Mark Barth, 34 years  
 Larry Bauer, 42 years  
 Marjorie Becker, 30 years  
 Brian Belka, 30 years  
 Dominique Bergeron, 30 years  
 Melvin Berry, 22 years  
 James Beshaler, 30 years  
 Gary Bishop, 13 years  
 Cheryl Blackman, 30 years  
 Lynn Blair, 19 years  
 Donald Boston, 44 years  
 Eric Boughner, 9 years  
 Dennis Brass, 45 years  
 Klaus Brauer, 29 years  
 William Brothers, 32 years  
 Paul Brown, 13 years  
 Josephine Browne, 18 years  
 William Broyles, 41 years  
 Kevin Bruce, 27 years  
 Larry Bruns, 42 years  
 Allen Buchanan, 31 years  
 Dianne Buchanan, 22 years  
 Victor Buonadonna, 33 years  
 Frank Burhans, 28 years  
 Barbara Cannon, 28 years  
 Barbara Carpenter, 16 years  
 Robert Carteen, 42 years  
 Jimmie Chapman, 35 years  
 Arthur Charron, 21 years  
 Colleen Chin, 32 years  
 Irwin Chinsky, 47 years  
 Hsin-Nan Chou, 36 years  
 Elvan Cleveland, 21 years  
 Terry Comeau, 24 years  
 Elaine Cooper, 27 years  
 Reymondo Cornejo, 30 years  
 Billy Crow, 31 years  
 Peter Cushen, 38 years  
 Steven Dahlgren, 26 years  
 Maxine Delano, 25 years  
 Terry Dickens, 12 years  
 Suzette Dillon, 14 years  
 Tommy Dobsch, 12 years  
 Thomas Doffing, 26 years  
 Robert Doles, 20 years  
 Vijayalakshmi Duraiswamy, 20 years  
 David Dyrseth, 20 years  
 Joseph Eagen, 17 years

Linda Edwards, 29 years  
 Kenneth Ehrenberg, 23 years  
 Chester Ekstrand, 42 years  
 Sharon Elstran, 32 years  
 Jennifer Encinas, 36 years  
 David Fankhauser, 24 years  
 Paul Farnsworth, 29 years  
 Richard Feldbusch, 37 years  
 Raymond Ficek, 30 years  
 Richard Fiedler, 22 years  
 Frances Fitzgerald, 40 years  
 Patrick Fitzgibbon, 31 years  
 John Fjeld, 34 years  
 Joseph Fludd, 41 years  
 Patricia Ford, 27 years  
 Richard Forschler, 30 years  
 Sandra Fowler-Ellis, 31 years  
 Gerald Fuqua, 35 years  
 Robert Galech, 22 years  
 Linda Garner, 33 years  
 Dennis Gaskill, 29 years  
 Janet Gergich, 24 years  
 Joseph Gernand, 28 years  
 Donald Gilbert, 33 years  
 Thomas Gillespie, 22 years  
 James Gillmore, 31 years  
 Russell Godfrey, 20 years  
 Donald Grosenick, 39 years  
 Donald Gsell, 40 years  
 Neva Gurb, 22 years  
 Wendy Hake, 23 years  
 John Hanks, 26 years  
 James Hansen, 30 years  
 Mary Harding, 33 years  
 Walter Harris, 39 years  
 Fredd Harsh, 29 years  
 Grace Hatch, 29 years  
 William Hawley, 33 years  
 Judith Heggen, 19 years  
 John Hennessy, 40 years  
 Malan Hepper, 34 years  
 Virginia Hernandez, 12 years  
 Patricia Herrmann, 23 years  
 Michael Hewett, 27 years  
 Timothy Hickok, 32 years  
 Steven Hill, 35 years  
 Barbara Hirschberg, 30 years  
 Liem Hoang, 24 years  
 Michael Hoban, 42 years  
 Steven Holder, 13 years  
 Jerry Holmes, 21 years  
 Barrett Hoyle, 25 years  
 Hernan Hoyos, 27 years  
 Lee Hutchinson, 41 years  
 Brenda Jackson, 38 years  
 Sharon Jackson, 24 years  
 Julieanne Johansen-Barlow,  
 22 years

Donald Johnson, 38 years  
 Charles Jones, 5 years  
 Cary Joslin, 12 years  
 Linda Jue, 38 years  
 Dennis Jump, 9 years  
 Martha Kavanagh, 20 years  
 David Kehrl, 23 years  
 Sylvia Keyhani, 8 years  
 Bobby Keys, 42 years  
 Ronald Koenig, 39 years  
 Craig Kramer, 29 years  
 Joseph Kranak, 41 years  
 John Krauch, 22 years  
 Thomas Lawrence, 25 years  
 Richard Lederich, 42 years  
 Walter Leeser, 31 years  
 Richard Lenk, 37 years  
 Shafik Leonard, 23 years  
 Carl Lester, 30 years  
 William Leveroni, 17 years  
 Christine Linden, 41 years  
 Rayburn Linville, 22 years  
 Howard Liu, 9 years  
 Orville Lof, 30 years  
 Danny Loholt, 33 years  
 Ellis Louey, 23 years  
 James Malcolm, 3 years  
 Raymond Mar, 29 years  
 Richard Maroon, 29 years  
 Warren Martin, 37 years  
 Norma Martinez, 32 years  
 Dileep Mathur, 21 years  
 Gerald Matyus, 11 years  
 Bruce May, 30 years  
 Raymond Mc Manus, 25 years  
 James McCurdy, 29 years  
 James McKinley, 43 years  
 John Meinzenbach, 43 years  
 James Melton, 26 years  
 Ronald Mercer, 31 years  
 Walter Mickelbart, 25 years  
 Guy Middleton, 24 years  
 John Milkman, 34 years  
 Michael Morr, 31 years  
 Donald Mossman, 30 years  
 Kim Muck, 29 years  
 Linda Nelson, 21 years  
 Patrick Nohalty, 27 years  
 Daniel Norman, 21 years  
 Katherine Obmascik, 6 years  
 Elizabeth Ogden, 30 years  
 Audrey Orgun, 14 years  
 Munir Orgun, 30 years  
 Donald Oss, 27 years  
 William Ostliff, 25 years  
 Thomas Paige, 27 years  
 Cheryl Park, 16 years  
 Jack Paul, 6 years

Hugh Paustian, 30 years  
 Rita Paustian, 29 years  
 Dan Phillips, 25 years  
 Nick Podue, 29 years  
 David Poinier, 25 years  
 Steven Pollard, 28 years  
 Larry Preciado, 28 years  
 Anthony Pritchard, 30 years  
 Paul Pugh, 29 years  
 Edward Quiter, 22 years  
 Robert Read, 30 years  
 Patrick Reilly, 33 years  
 Ambrose Reisenauer, 32 years  
 Karen Riedel, 19 years  
 Gregory Rivett, 30 years  
 John Roberts, 36 years  
 Robert Roe, 30 years  
 Theodore Rogers, 31 years  
 Donna Romstad, 1 year  
 David Ross, 32 years  
 Raymond Rupert, 10 years  
 Denise Sage, 21 years  
 Allen Schafer, 38 years  
 David Schimer, 29 years  
 Robert Schmid, 37 years  
 Jon Schunke, 36 years  
 Herschel Scott, 10 years  
 Roger Seeman, 42 years  
 Doreen Sensenbach, 36 years  
 Irene Simons, 41 years  
 Thomas Skelly, 30 years  
 Dennis Snyder, 31 years  
 James Sommers, 12 years  
 Terry Soterhou, 28 years  
 William Stark, 35 years  
 Leland Stokes, 27 years  
 Michael Stroh, 27 years  
 Karen Swanson, 22 years  
 William Swinhart, 37 years  
 Ronald Talcott, 23 years  
 Arthur Thorp, 18 years  
 Robert Thorson, 35 years  
 Prasert Thuntarug, 17 years  
 Dennis Tooman, 30 years  
 Louis Toppano, 29 years  
 Randall Trathen, 35 years  
 Caroline Tucker, 14 years  
 Marilyn Tucker, 31 years  
 Richard Valles, 50 years  
 David Van Westen, 24 years  
 Laurie Waaramaa, 43 years  
 Martin Wade, 23 years  
 Robin Walton, 34 years  
 Erik Ward, 43 years  
 Kenneth Watson, 33 years  
 John Webber, 30 years  
 John Wehling, 2 years  
 Richard Welch, 23 years

## RETIREMENTS:

The following employees retired in July from The Boeing Company.

Marilyn Wellfonder, 34 years  
Mark Wexler, 16 years  
Charles White, 27 years  
Gary Wiebusch, 42 years  
Mary Wilcox, 22 years  
Joe Williams, 26 years  
Julie Wills, 30 years  
Robert Wilson, 32 years  
William Wilson, 30 years  
Mike Witte, 31 years  
Dean Wright, 32 years  
Ralph Wright, 27 years  
Mikou Wu, 21 years  
Richard Yingling, 21 years  
Frank Zaragoza, 36 years  
Stanley Zdoniak, 13 years  
David Zorger, 24 years

## IN MEMORIAM:

The Boeing Company offers condolences to the families and friends of the following employees.

**Terrie Bentley**, technical data designer; service date Nov. 13, 1997; died July 27  
**Vincent Cascia**, mechanical scientist; service date June 17, 1978; died July 26  
**Eric Chow**, design and analysis engineer; service date Oct. 24, 1983; died July 31  
**Charles Clayborn**, tank test and repair mechanic; service date May 21, 1990; died July 25  
**Richard Dombay**, composite fabrication; service date Oct. 12, 1976; died July 23  
**Joseph Draham**, sheet-metal assembler; service date Aug. 25, 2006; died Aug. 2  
**Granger Lam**, business and planning analyst; service date Jan. 12, 2001; died July 29  
**Sydney Money**, manufacturing planner; service date May 29, 1998; died July 28  
**Shawn Pannell**, engineer; service date April 11, 1987; died July 29  
**Cynthia Perez**, tool coordinator; service date June 17, 1987; died Aug. 1  
**Petra Rogowski**, electrical system installation assembler; service date Sept. 12, 1988; died July 24  
**Gregory Singleton**, quality specialist; service date Nov. 18, 1982; died July 28  
**Gary Young**, database administrator; service date Jan. 21, 1978; died Aug. 12  
**Michael Wells**, maintenance electrician; service date Dec. 26, 1980; died Aug. 9

## Around Boeing



### 787 TEAM CONDUCTS LOW-SPEED TAXI TESTS ON SECOND DREAMLINER

Boeing last month conducted low-speed taxi tests on ZA002, the second 787 Dreamliner. During the taxi testing, pilots Randy Neville, Regis Hancock, Heather Ross and others took the airplane through a series of trips down the runway to test steering and braking. Powered by two Rolls-Royce Trent 1000 engines, the 787 reached speeds of approximately 100 knots (about 115 miles per hour, or 185 kilometers per hour). ED TURNER/BOEING

### BOEING, WESTJET ANNOUNCE ORDER FOR 14 NEXT-GENERATION 737-700S

Boeing and Calgary-based WestJet recently announced an order for an additional 14 Next-Generation 737-700s. The new airplanes will provide greater fleet flexibility for WestJet's strategic growth plans. WestJet also announced it is rescheduling deliveries of 16 leased and direct-buy 737s to help the carrier more evenly spread its growth over the next several years. WestJet operates an all-Boeing fleet of 81 Next-Generation 737s.



## FLYING RIGHT FOR 75 YEARS.

For 75 years the men and women of Continental Airlines have set themselves apart in their commitment to total passenger satisfaction. So it's no surprise that today Continental is one of the world's foremost carriers. At Boeing, we're proud to salute our friends and colleagues at Continental on this special anniversary. And even prouder to be their partner in what we're sure will be a bright future.

 **BOEING**

*This year, Continental Airlines celebrated its 75th anniversary and Boeing recognized this achievement with an advertisement placed in Continental magazine, the airline's in-flight publication. Operating an all-Boeing fleet, Continental Airlines has grown to become one of the world's foremost carriers and we salute our longtime partners on a great history and exciting future.*



## ROLLING OUT A FUTURE OF SAFER SEAS.

The P-8A Poseidon, the U.S. Navy's next-generation multi-mission maritime aircraft, was recently unveiled in a celebration of the program's progress and success. On schedule and on budget, the P-8A will now begin a rigorous test schedule ultimately leading to operational capability and deployment. We're proud to salute the Navy and the entire P-8A team on achieving this important milestone.

 **BOEING**

*This new Integrated Defense Systems print ad celebrates the recent rollout of the P-8A Poseidon for the U.S. Navy and the program's success and progress toward service entry in 2013. The ad has or will run in select military and congressional trade publications, as well as the Seattle Times.*