



# Frontiers

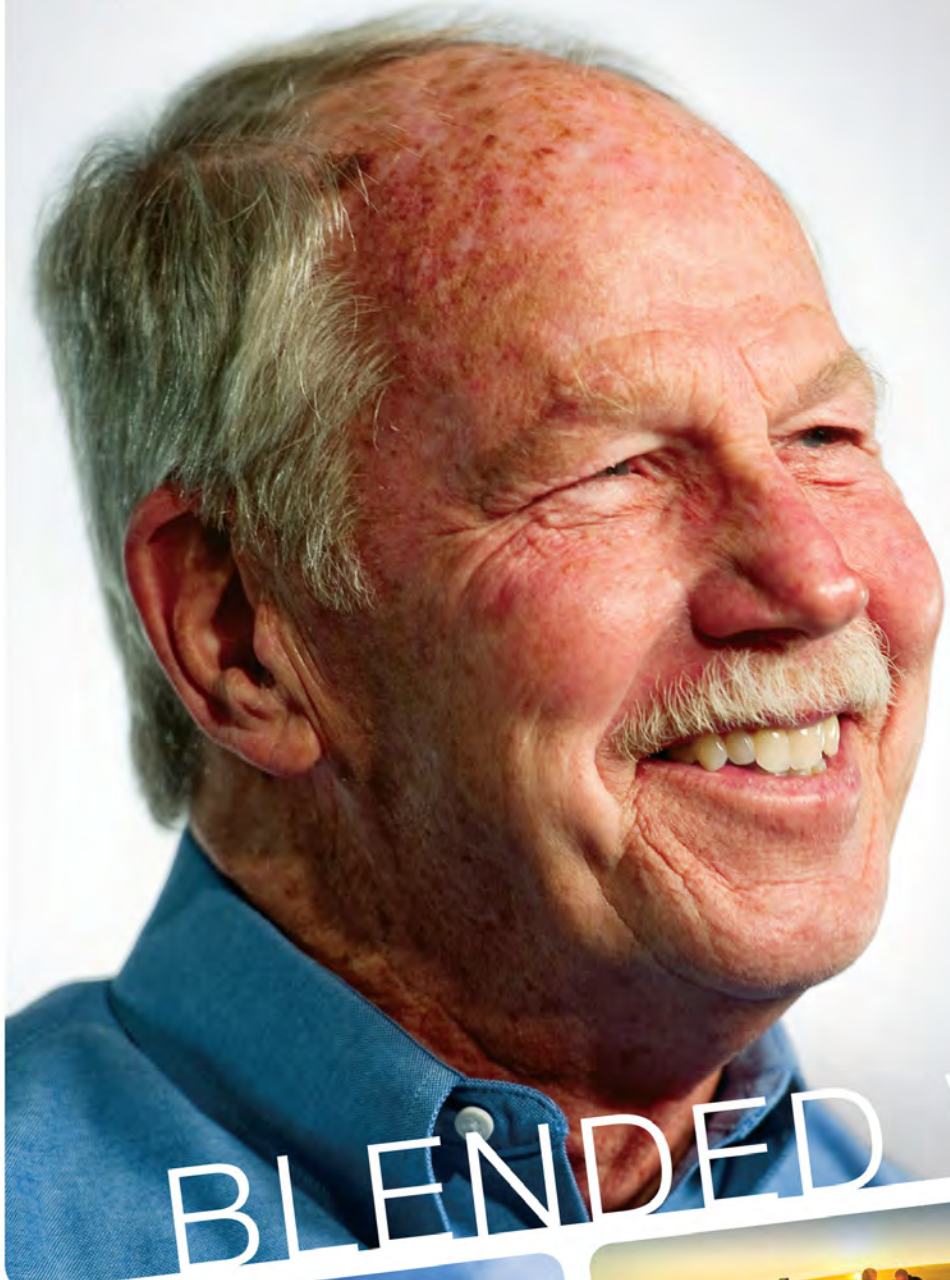
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FEBRUARY 2012 / Volume X, Issue IX



## Mod squad

New opportunities  
at Boeing San Antonio



“Engineers provide solutions to problems; we’d like to use less fuel. Engineers are going to solve that.”

**Bob Liebeck**

Chief Scientist and Manager  
Blended Wing Body Project

# BLENDED WING

Stories of  
**innovation**  
at Boeing



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The stories behind the ads in this issue of *Frontiers*.

Inside cover:



**“Blended Wing Body:** The shape of things to come” is one in a series of innovation stories told by Boeing employees like Bob Liebeck. Learn more at [www.boeing.com/stories](http://www.boeing.com/stories). Also, see related article on Page 14.

Pages 12–13:



“Enduring Value” is one of several ads in a Boeing Defense, Space & Security campaign highlighting the capabilities Boeing brings its customers including cost-effective technologies and best-of-industry partnerships. The ad appears in print and online business, political and trade publications.

Page 65:



This ad highlights the U.S. Department of Defense's decision to award the Ground-based Midcourse Defense contract renewal to the Boeing-led team and recognizes Boeing's partnership with the Missile Defense Agency. The

ad appeared in the *Huntsville Times* and key defense and congressional publications.

Back cover:



In December, Southwest Airlines announced a firm order for 150 737 MAX airplanes, making it the launch customer for this newest variant of the world's best-selling airplane. The 737 MAX offers an optimized design and new engines for maximum

performance, efficiency and passenger appeal. This ad appeared in *The Wall Street Journal*.

# 28 It's a mod, mod, mod, mod world

The Boeing San Antonio site, long experienced in the maintenance, modification and upgrading of military aircraft, now is supporting change incorporation and refurbishment work on 787 and 747-8 commercial jets before they are delivered to customers. This successful coordination of commercial and military work demonstrates the power of “One Boeing.”

**COVER IMAGE:** BOEING MECHANIC OSCAR LARKINS WORKS INSIDE THE CARGO HOLD OF A 747-8 FREIGHTER UNDERGOING MODIFICATIONS AT BOEING'S SAN ANTONIO SITE. BOB FERGUSON/BOEING

**PHOTO:** A MIX OF BOEING COMMERCIAL AND MILITARY AIRCRAFT, INCLUDING THE VENERABLE KC-135 TANKER, LEFT, AND NEW 747-8, IS A COMMON SIGHT ON THE SAN ANTONIO FLIGHT LINE. BOB FERGUSON/BOEING



# Frontiers

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## True LUV

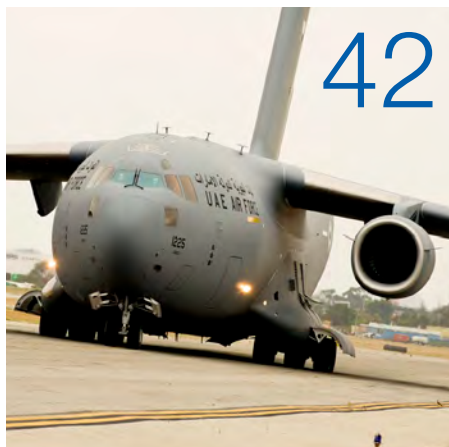
The partnership between Boeing and Southwest Airlines goes back to the early 1970s when Southwest bought its first three 737s. Southwest now is the world's largest 737 operator and the launch customer for the fuel-efficient 737 MAX. A recent breakfast at Seattle's Boeing Field offered a glimpse of how well the two companies get along. PHOTO ILLUSTRATION: BOEING



## The right stuff

James Bell, corporate president and chief financial officer, is retiring after a Boeing career that spanned four decades. In a recent interview, Bell talked about his journey from his boyhood home in the South Central neighborhood of Los Angeles to the offices of Boeing Corporate, where he has been a champion of diversity and leadership and helped guide the company during a difficult time.

PHOTO: BOB FERGUSON/BOEING



## First in flight

It was a year for the record books for Boeing's Flight Operations team, which tallied more than 8,300 flights in 2011. Boeing aircrews conducted operations all over the United States and in dozens of countries around the world—demonstrating, testing and delivering the company's military and commercial aircraft.

PHOTO: BOEING

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## 20 Performance under pressure

Boeing's Echo Ranger, an autonomous unmanned submersible, can dive to depths of 10,000 feet (3,000 meters) and remain underwater for 40 hours with its rechargeable energy system. This photo essay captures recent Echo Ranger diving tests off California's Catalina Island.

PHOTO: BOB FERGUSON/BOEING



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## The great Southeast

Southeast Asia includes 10 countries and is an emerging economic force. While Singapore is Boeing's biggest customer in the region, the company is building relationships throughout Southeast Asia that will grow opportunities for its military and commercial businesses.

PHOTO: SHUTTERSTOCK

## INSIDE

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Boeing made great progress on many fronts in 2011 and it enters the new year a stronger and more competitive company, writes Jim McNerney, chairman, president and chief executive officer. In the run-up to its 100th birthday in 2016, Boeing faces huge opportunities for growth amid increasing global competition, he says.

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# The road ahead —

After a watershed year in 2011, Boeing is poised for significant growth and tougher competition



Last year was truly a watershed for Boeing—a pivotal year where we made substantial progress on the business and product strategies that are critical to our future and to the success of our customers.

Through an enterprise focus on program performance and productivity improvements, we also delivered record revenues, strong earnings and the cash flow needed to continue investing in our people and the innovative products and services of the future.

It's hard to remember a year with more major achievements than 2011.

For instance, at Boeing Commercial Airplanes:

- We began a new era in aviation and retired significant business risk by getting the 787 and 747-8 certified and delivered into revenue service.
- We solidified our single-aisle product strategy with the successful launch of the 737 MAX—an airplane with the performance our customers want, along the timeline they need. More than 1,000 orders and commitments from 15 customers in less than six months bears the proof.
- We reached a record backlog with 805 new orders, including an unprecedented 200 orders for the 777 family, and a key sale of 27 new 767-300 Freighters to FedEx Express that secures production of the 767 and its military derivatives for years to come.
- We continued to grow our aviation services business and the value it provides our customers.
- And we strengthened our commitment to deliver sustainable growth and

better manage business risks by adjusting the balance of work done in-house and at our global partners' sites; by reaching an early four-year contract extension with our machinists union in Puget Sound; and by expanding and diversifying our manufacturing and engineering base in Boeing South Carolina, Helena, Mont., Huntsville, Ala., and other locations.

Boeing Defense, Space & Security also strengthened its market position and growth prospects with several strategic wins and new contract awards. For example:

- Our victory over EADS in the U.S. Air Force tanker competition maintains our 50-year franchise as the supplier of tankers to the U.S. military and gives us a big advantage in the sizable international tanker market.
- Completing the agreement between the United States and Saudi Arabia for 84 new F-15s and upgrades to 70 existing ones will extend F-15 production into the second half of this decade and position it well for additional sales.
- Our contract with the U.S. Navy for 13 P-8A Poseidon aircraft begins a production run of this 737 derivative that we expect to exceed 100 airplanes.
- Winning the Ground-based Midcourse Defense development and sustainment contract preserves our role as prime contractor on this important program and keeps us engaged in technology development in the missile defense segment.
- And, with wins on NASA's new Space Launch System, we will design,

develop and produce the first and upper stages and avionics for the United States' next-generation, human-rated rocket that will enable space exploration beyond Earth's orbit.

Behind many of these and other 2011 achievements is more conclusive evidence of the unique competitive strengths we have as a company when our people and teams work across organizational lines for shared "One Boeing" success. The collaboration between Defense, Space & Security and Commercial Airplanes on the Air Force tanker win is a great example, but it is far from the only one.

Certification of the 787 and 747-8 was a tremendous joint effort between Commercial Airplanes and our Test & Evaluation team within Engineering, Operations & Technology. EO&T also played a vital role in resolving technical issues that arose on those programs. Boeing International and Boeing Capital Corp. were major contributors to key commercial airplane sales, including the blockbuster deals with Lion Air and Southwest Airlines. And Boeing International and our Government Operations team were instrumental in bringing to completion the Saudi F-15 agreement.

As a result of the real and positive progress that defined 2011 for Boeing, we enter 2012 a stronger, more competitive company with a clearer view of the future and a huge opportunity for growth in the run-up to our 100th anniversary in 2016.

To take full advantage of that opportunity, however, means addressing some big issues that still confront us—among them increasing global competition, constrained

# opportunity



government spending, and rising health care and pension costs. This will require further action to both consolidate our defense-related infrastructure while we scale up a diversified commercial manufacturing and engineering base, and to curtail growth in our health care costs and long-term pension liabilities while upholding our commitment to competitive benefits for employees. Not succeeding on the latter could severely restrict our ability to fund future investments.

With the progress that the people of Boeing have made over the past few years—especially in 2011—I can think of no better team than this one to overcome these challenges and deliver on the promise of growth before us.

In many respects, this is the moment we have been hoping for—and working toward—for a long time.

By continuing to do things right—and always doing the right thing—we will solidify our industry leadership and establish our place among the most respected and capable companies the world has ever known. ■

— *Jim McNerney*

*Boeing chairman, president and chief executive officer*

**PHOTOS: (Above left)** The 747-8 Intercontinental and the 787 Dreamliner in flight.

LEO DEJILLAS/BOEING **(Right)** Jim McNerney.  
BOB FERGUSON/BOEING

**PHOTO ILLUSTRATIONS: (Above middle)**

In this artist's concept, a KC-46A Tanker refuels a C-130. **BOEING (Above right)** An artist's concept of NASA's new Space Launch System. NASA





**A FLARE FLIGHT:** A U.S. Marine Corps MV-22 Osprey deploys flares over Afghanistan. The flares, along with chaff, are used as countermeasures to specific threats from unfriendly forces. The Bell Boeing V-22 program recently received a development contract from U.S. Naval Air Systems Command to install and test the Navy's next-generation electronic warfare system on flight-test aircraft. This includes a "smart dispensing" system for chaff and flares, as well as an advanced radar threat warning system. The tilt-rotor V-22 Osprey flies like a fixed-wing aircraft and lands and takes off like a helicopter. PHOTO: U.S. MARINE CORPS

## Quotables

“You board a flight where three or four hours later, you’re standing in the International Space Station.”

– John Elbon, Boeing Space Exploration vice president and general manager, speaking at NASA’s Future Forum in December, on the potential of Boeing space products in a commercial space industry serving low Earth orbit passenger destinations.

“The biggest problem is getting the smile off their faces.”

– Mark Hoey, Cathay Pacific 747 chief pilot, on crew reaction to the new 747-8 Freighter during its first visit to Sydney, Australia, in early December. Cathay has firm orders for 10 747-8Fs. As reported in The Australian Dec. 9.



# Better, by design

A passion for Boeing products  
and the environment inspires  
this employee *By Patrick Summers*

As the leader of Boeing's new Design for Environment program, Paul Wright is helping Boeing engineers improve the environmental performance of company products. In this *Frontiers* series that profiles employees talking about their jobs, Wright discusses his enthusiasm for a job that benefits not just the company but people's lives, too. PHOTO: JESSICA OYANAGI/BOEING

**W**hen I think about what I do at Boeing and leading Design for Environment, for me it's a chance to help create a better world for my kids and their kids.

I grew up in an airplane family. My dad ran the sales office for Alcoa and sold aluminum to Boeing. I have always loved airplanes and am fascinated by all things mechanical. After I earned my mechanical engineering degree, I wanted to leverage my career and energy to do something positive for the world.

That is a big part of why I am excited about Design for Environment. We have developed an amazing set of tools to help engineers consider the environment in the decisions they make every day designing Boeing products. The tools help turn undefined "green" performance goals into engineering terms that enable measurable technical targets and often lead to a more efficient design.

A good example of designing for the environment was developing a chrome-free primer for Next-Generation 737s and several of our military products. Eliminating the use of chrome, a carcinogen, is the kind of smart design decision that adds value to our products. It also creates a safer work environment and keeps Boeing moving

forward as the industry leader in environmental performance.

I became the first full-time leader of Design for Environment in the fall of 2010. I meet with senior engineers around the company and explain our mission and how their groups can use our design applications. The response has been encouraging. We recently trained more than 75 engineers on the V-22 and Chinook helicopter Global Services & Support programs on how to apply the tools.

The real satisfaction for me comes when I see other people embrace the tools and come up with a more environmentally sound design solution, one with better materials and lower costs.

We're making progress. Environmental stewardship is now in The Boeing Engineering Code, the standards and principles that guide engineering at Boeing. I'm also excited that Design for Environment is woven into activities for 2012 National Engineers Week, which takes place this month.

If I can use my skills to help move forward an industry that is such a big part of so many people's lives, then we will have made progress in passing on a better world to our children. ■

*patrick.a.summers@boeing.com*

# The Little Bird that could

Known by many names, the OH-6A Cayuse has enjoyed success for nearly 50 years

*By Henry T. Brownlee Jr.*



**F**or a helicopter sometimes called a “flying egg,” the OH-6A Cayuse more than proved its mettle.

Initially fielded during the Vietnam War as a scout helicopter, the Hughes OH-6A and derivative models have seen action in Granada and Panama during the 1980s, as well as in the Gulf wars, Somalia and the Balkans.

They have also served a variety of humanitarian and commercial missions, from replacing the culturally iconic Hollywood sign in the Santa Monica Mountains near Los Angeles with a more permanent structure to helping rescue more than 3,000 trapped and injured people after the eruption of a volcano in Colombia.

They have even been used extensively by law enforcement.

The story of the Cayuse begins in 1960, when the U.S. Army requested proposals for a light observation helicopter, or LOH, that could fulfill tactical objectives in the areas of observation, manned surveillance and transport. The Army wanted a state-of-the-art, easy-to-maintain, low-cost rotorcraft.

Twelve companies submitted proposals. A joint Army-Navy evaluation team selected three to develop prototypes: Bell Helicopter, Hiller Aircraft Corp. and Hughes Tool Company’s Aircraft Division, which offered the Model 369, later designated the OH-6A.

Hughes signed its contract Nov. 13, 1961, for a helicopter with a crew of two that could carry up to three passengers. First flight of the Hughes YOH-6A took place in February 1963.

Each contractor was required to provide five helicopters to the Army for the competition. After the delivery of the prototypes in December, the Army began a six-month evaluation, which averaged 1,500 hours of testing at Fort Rucker, Ala., and Edwards Air Force Base, Calif.

Between March 12 and April 7, 1966, a single OH-6A prototype set 23 world records for speed, distance and altitude.

In July 1966, Hughes was selected as the winner of the competition. Its light

**1. PHOTO:** A U.S. Army OH-6A Cayuse in flight. **BOEING ARCHIVES**

**2. PHOTO:** A 530MG Defender “Night Fox” with a chin-mounted Forward Looking Infrared system. **BOEING ARCHIVES**

**3. PHOTO:** The “Quiet One,” a Hughes modified OH-6A with advanced rotors and an engine exhaust muffler that reduced the noise level significantly. **BOEING ARCHIVES**

**4. PHOTO:** A YOH-6A is prepared for a test during the initial U.S. Army evaluation. **BOEING ARCHIVES**

**5. PHOTO:** A No Tail Rotor, or NOTAR, test version. **BOEING ARCHIVES**

**6. PHOTO:** A McDonnell Douglas MD 500D on a rescue mission in Colombia in 1985 after the eruption of the Nevado del Ruiz volcano. **BOEING ARCHIVES**

Between March 12 and April 7, 1966, a single OH-6A prototype set 23 world records for speed, distance and altitude.



observation helicopter met the Army's requirements and had demonstrated that it could perform close visual observation, target acquisition, command and control logistics, reconnaissance and defensive suppressive fire.

In keeping with the Army's tradition of naming its aircraft after Native American tribes, the new helicopter was named Cayuse, after a tribe in Oregon.

Hughes Aircraft began delivering production models in September 1966. The Army ordered more than 1,400, many of which saw action during the Vietnam War. Hughes Aircraft built nearly 100 a month during that time.

Although the official Army designation

for the OH-6A was Cayuse, it was also called the “Loach” (for the LOH acronym) and “Little Bird.” Due to its aerodynamic and structurally strong egg-shaped body, it was also sometimes called the “Flying Egg,” as well as “Killer Egg” when equipped with armament.

Since Vietnam, the OH-6A gained accolades with the 160th Special Operations Aviation Regiment (Airborne), known as the “Night Stalkers,” because of its ability to perform night missions undetected. Later, Hughes modified the OH-6A with advanced rotors and an engine exhaust muffler that reduced its noise signature so much the Cayuse became known as the “Quiet One.”

Hughes also modified the OH-6A for commercial use as the Hughes 500. In 1984, McDonnell Douglas acquired Hughes and the Hughes 500 was re-designated the MD 500. Like the OH-6A Cayuse, the Hughes 500 was produced in several variations. Two notable versions were the “Night Fox,” a police version equipped with Forward Looking Infrared, and the No Tail Rotor, also known as NOTAR, derivative, a low-noise model used by the U.S. Border Patrol and commercial and private operators.

In 1999, the MD helicopter commercial line was sold. But in 2005, Boeing bought back rights to sell MH-6 aircraft to military customers. Today, the commercial helicopter business derived from the OH-6A is owned by an investment fund.


Boeing currently is demonstrating to customers around the world an upgraded AH-6i Light Attack/Reconnaissance helicopter whose roots can be traced to the OH-6A Cayuse. The AH-6i prototype, as well as a version of the Little Bird known as the H-6U that can be manned or unmanned, were developed and built in Mesa, Ariz. The AH-6i program is anticipating the start of production once customer agreements have been finalized. The H-6U will continue with developmental testing in 2012.

In all, more than 4,700 rotorcraft based on the Hughes Model 369 have been built for military, commercial and humanitarian efforts, making it one of the most successful helicopter programs by a heritage Boeing company. ■

*henry.t.brownlee-jr@boeing.com*

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TODAY TOMORROW **BEYOND**



# Innovating tomorrow

Video series tells the story of employees solving tough, real-world challenges

Photos by Bob Ferguson

The first time Boeing engineer David Loffing had an opportunity to walk through the new 747-8 Intercontinental at the Everett, Wash., factory, he imagined he was a future passenger taking a trip on the airplane and looking through a cabin window at the sweeping, magnificent wing.

Loffing helped design that wing, which features significant advancements in aerodynamics and technology over the wing on the 747-400. The redesign was challenging and involved many engineers.

"The teams that helped design the wing came from all kinds of backgrounds from all over the world," Loffing said. "It was a global effort to really make this wing happen."

Loffing's story, and those of other Boeing employees, now is featured in a series of videos highlighting Boeing innovation.

The first in the series has been screened on Boeing News Now. The videos will also be available to the public on Boeing.com and other channels.

"These videos tell the Boeing story of ingenuity and technology to the world," said John Tracy, Boeing chief technology officer and senior vice president, Engineering, Operations & Technology. "They are inspiring stories of real people who are changing the world and building upon our reputation as one of the world's most innovative companies."

The two- to three-minute videos capture employees' stories in their own words, showing how they developed innovative solutions to tough, real-world problems.

Additional innovation videos are scheduled to roll out monthly through the company's centennial celebration in 2016

and will address topics such as advanced 787 and 747-8 technologies; "drop-in" biofuels; the Blended Wing

Body concept demonstrator aircraft; advances in "intelligent graphics"; global air traffic management solutions; and research supporting NASA's Subsonic Ultra Green Aircraft Research project.

"Employees are passionate about telling the story behind the building of our amazing products, the challenges that the teams have overcome and the benefits that our customers and our communities will see as a result," said Fritz Johnston, vice president of Global Brand Management and Advertising.

"They know that ingenuity and teamwork are key to Boeing's prospering in competitive global markets and build reputation, brand and business."

In addition to Loffing, the series will feature Drew Mallow, Phantom Eye program manager, and Tom Cogan, director of Airplane Development programs. Phantom Eye is a hydrogen-powered unmanned airborne system that will be able to remain aloft for several days at 65,000 feet (19,800 meters). It is being readied for first flight at Edwards Air Force Base in California.

"This vehicle really represents the best of Boeing," Mallow said. "We have brought together technology experts from across the company to help us address all the unique challenges."

Just as Phantom Eye pushes the tech-



nology and innovation envelope, so, too, does Boeing's new 787 Dreamliner that Cogan helped design and develop.

"Boeing competes by being the best at innovation," Cogan said. "As long as we're the ones out in front providing the best value with innovation, then we're going to stay the leader." ■

*As each new video in the series is released, it will first be featured on internal channels such as Boeing News Now, Videos@Boeing, Manager News, on office and factory plasma screens, in Boeing Store locations and in Frontiers. For more information, see [www.boeing.com/stories](http://www.boeing.com/stories)*

**PHOTOS:** Highlighted in innovation videos are **(above and top middle)** the 747-8 Airframe Engineering Team's Peter Schupp, left, and Terry Tan; Tania Ortiz and David Loffing. **(Center and top right)** Mechanics Willie Washington and Maria Owen check a composite part; Tom Cogan, director of Airplane Development programs. **(Right and far right)** Ben Fraser works on Phantom Eye; Drew Mallow, Phantom Eye program manager, and Mindy Peterson.





# LUV story

## 737 delivery breakfast shows how Boeing and Southwest get along

By Peyton Whitley

First, there's breakfast.

This might seem like an odd place to appreciate the relationship between two businesses like Boeing and Southwest Airlines, but on a recent morning it became the perfect way to glimpse how two companies really can get along.

Southwest and Boeing do more than get along, of course. Southwest's fleet totals more than 550 737s, with many more to come. In December, Southwest, which has New York Stock Exchange ticker

code LUV, placed the biggest order in Boeing Commercial Airplanes' history, at list prices worth nearly \$19 billion, for 150 of the 737 MAX airplanes in development and 58 more Next-Generation 737s.

The breakfast occasion was Southwest's last scheduled 737-700 delivery for the year. About 15 people were gathered in a delivery-center conference room at Seattle's Boeing Field, including Boeing staff and a Southwest crew and their families—one of Southwest's benefits for employees is allowing family members to ride along on delivery flights.

"I can tell you, it is such a privilege to come up here," said Charlie Cafaro, a 28-year Southwest pilot who'd brought along his son, 20, who also plans to become a pilot.

"To work with Boeing is just awesome," Cafaro added.

As the morning continued, two other people showed their mutual affinity and respect. They were Dara Schmidt, who's been Boeing's sales director for Southwest for 13 years, and Bill Rogers, Southwest's resident representative for deliveries.

Between them, Rogers and Schmidt estimate they've delivered hundreds of 737s to Southwest. Rogers arrived in Seattle on behalf of Southwest in 1991 for what he thought would be a temporary assignment.

"We operate like a Swiss watch," Rogers said, only half-joking.

"Bill has it fine-tuned," Schmidt quipped. "I don't know anybody who can deliver planes so efficiently."





*“To work with Boeing is just awesome.”*

– Charlie Cafaro, Southwest pilot

**PHOTO ILLUSTRATION: (Above)** An artist’s concept of the 737 MAX in the Southwest Airlines livery. **BOEING**

**PHOTO: (Inset)** Celebrating Southwest’s last scheduled Next-Generation 737-700 delivery for 2011 are, from left, Boeing Commercial Airplanes’ Cheri Fischer, Victor McCullough and Tim Turner, Southwest Airlines’ Bill Rogers, and Commercial Airplanes’ Dara Schmidt. **MARIAN LOCKHART/BOEING**



That morning, Rogers estimated he’d performed at least 80 inspections of the delivery airplane as it moved through assembly in Renton, Wash., following the fuselage’s arrival from Wichita, Kan., six weeks earlier.

“Bill has a tremendous relationship with the mechanics,” Schmidt said. “When Bill identifies something as an issue, it’s an issue.”

As Schmidt and Rogers talked, other parts of the Boeing-Southwest relationship emerged.

Schmidt explained the December delivery dated back to a Southwest order placed in 2006, so five years went into putting the new airplane, with its sharp blue-and-camel leather upholstery, on the airport’s apron.

“I work with them every single day,” said Schmidt, who kidded that even though she lives in Seattle she should have a condo in Dallas because she’s there so often. Such relationships commonly develop out of countless meetings in Dallas, where Southwest is headquartered, she said.

Then Schmidt brought up something to illustrate how well Southwest and Boeing get along: She is a member of the Southwest Culture Committee. That’s a group of about 100 Southwest employees who make sure the Southwest culture is spread “throughout the system,” Schmidt said.

Only a handful of non-Southwest employees have been invited to sit on the committee. She’s one.

What does the culture committee do? Well, among other things, Schmidt

explained, they have what’s called a “hokey day,” where committee members show up to a Southwest flight unannounced to relieve the flight attendants during the “turn” and clean the airplane so the flight attendants can rest their feet.

Even that pales next to other Southwest cultural episodes such as Halloween, Rogers noted, where every office disappears under layers of pumpkins ... and other things. During Halloween, the local office transforms into a different world.

“Some departments might look like a castle, and others might look like an aquarium, where people are dressed up like fish,” Rogers said, trying to contain his glee about working in such a place. This year’s winning department performed a spoof on the musical *Grease*, with



a Southwest spin, of course.

Such stories aside, the business of the morning continued and by 10:15, Rogers was on the phone to the Federal Aviation Administration in Oklahoma City, transferring the bill of sale.

"Congratulations, Southwest," said the FAA on the speakerphone. Everyone clapped.

A few minutes later, Rogers was handed the keys to the plane in a small paper envelope.

The keys, though symbolic, are stamped brass and say "Boeing" on one side and "10-60370-1" on the other. That's not some secret code, Rogers explained.

"It's a part number," he said.

A few minutes later, everyone moved outside for a first look at Southwest's

newest airplane. Moving into the 737, they were struck by the "new-car smell."

"It's like a thousand Chevy Corvettes," Cafaro joked.

Outside, Larry Restine, a 20-year Southwest pilot, performed an airplane walk-around, showing his wife, Lynda, and others how he looked for certain things, such as anything loose or out of place. Every fitting, he observed, is marked with a dab of paint, making it easy to notice if something is loose, since the two parts of the dab won't line up if a connection is coming apart.

By afternoon, the Southwest crew, guests and their families were on board and the 737, registration number N969WN, headed for Phoenix, where Southwest would give the airplane one more check.

Such deliveries have occurred hundreds of times before and are to be repeated hundreds more over the next few years; Southwest is continuing to receive Next-Generation 737s and expecting to get the first 737 MAX, the efficient new-engine variant, in 2017.

For pilots such as Cafaro, whose first 737 delivery in Seattle was in 1988, a year before Southwest achieved \$1 billion in annual revenue, getting a chance to come back won't be soon enough.

"It's always fun." ■

*peyton.whitely@boeing.com*



*From those first three 737-200s, Southwest now operates the largest 737 fleet in the world.*

## Southwest journey began with 3 Boeing 737s

Southwest was incorporated in 1967 as the Air Southwest Company. On March 29, 1971, the day the airline's name became Southwest Airlines, Boeing offered to sell Southwest three 737-200s.

Less than three months later, those Southwest 737s were carrying passengers between three Texas cities, with \$20 one-way fares.

The Southwest history with Boeing and the 737 would continue to grow as the airline became launch customer for the 737-300, 737-500 and Next-Generation 737-700. Today, Southwest is the launch customer for the new-engine variant in development known as the 737 MAX. No other airline has served as the launch customer for four Boeing airplane models.

As its 737 fleet grew, Southwest prospered, with 39 consecutive years of profitability. Southwest exceeded the \$1 billion revenue mark for the first time in 1989.

From those first three 737-200s, Southwest now operates the largest 737 fleet in the world. With the AirTran merger in 2011, Southwest's fleet of more than 550 737s grew by another 50 737s and 80 717s. The airline now operates more than 3,300 flights a day, and its 737s make an average of six flights and spend about 12.5 hours in flight daily, with an average trip length of 658 miles (1,060 kilometers), according to Southwest.

– Peyton Whitely

**PHOTOS: (Far left)** Inspecting the last scheduled Southwest 737-700 delivery for 2011 are, from left, Tim Turner and Victor McCullough of Boeing Commercial Airplanes and Bill Rogers, Southwest resident representative for deliveries. MARIAN LOCKHART/BOEING  
**(Above)** Southwest Airlines was the launch customer for the 737-300, with the first plane delivered in November 1984. **(Inset)** One of Boeing's many unique liveries for Southwest. BOEING ARCHIVES

# Deep impact

## Boeing's Echo Ranger demonstrates potential of unmanned subs

By Diane Stratman and photos by Bob Ferguson

Everyone knows Boeing for its commercial and military aircraft. Few realize the Boeing name goes far into the ocean depths. For more than 40 years, Boeing has been in the maritime deep submersible industry. Rockwell International, a Boeing heritage company, pioneered deep-dive manned submersibles in the 1960s. And Boeing later was among the first to build an unmanned sub—Echo Ranger—capable of operating autonomously, not tethered to a mother ship and using mission-oriented navigation software to adjust to changing conditions.

The 18-foot-long (5.5-meter) Echo Ranger was first developed by Boeing in 2001 to capture high-resolution seabed imagery for the oil and gas industries. Since then, the sub's onboard computers and payloads have evolved into a sophisticated array of technology that makes it uniquely suited for long-endurance, deep-dive missions that include surveillance, reconnaissance and environmental work.

The 5-ton (4.5-metric-ton) sub currently is being tested for possible use by the U.S. Navy to patrol enemy waters and secure American harbors against threats. Its applications also may involve missions for the University of Southern California's Wrigley Institute for Environmental Studies.

"This vehicle could take the place of a fully manned submarine



**PHOTOS: (Left)** Echo Ranger, Boeing's autonomous underwater vehicle, dives off Catalina Island, Calif. **(Insets, clockwise from top left)** Echo Ranger is lowered into the water at the University of Southern California Wrigley Marine Science Center, Catalina Island; a close-up of the Echo Ranger logo; Ross Peterson, Echo Ranger team lead, secures the propeller for submerged operations and testing; the team performs vehicle pre-dive checks on board the vehicle maintenance cart; mechanical engineer Maurice Mejan pressurizes the ballast system for vehicle pre-dives; Echo Ranger is staged on a vehicle maintenance cart for pier-side operations; electrical engineer Sergio Espinoza prepares a scientific payload for testing; the five-blade, high-efficiency propeller used for main propulsion.

# Deep impact

to carry out some of the dull, dirty or dangerous things that large submarines perform,” said Mark Kosko, program manager for the Boeing Unmanned Undersea Systems group. “Also, employing unmanned submersibles like Echo Ranger would cost just a fraction of what it costs to deploy a full-scale manned sub.”

Able to withstand the crushing pressures of deep waters, the bright yellow unmanned submersible can dive to depths of 10,000 feet (3,000 meters) at speeds of up to 9 mph (8 knots, or 15 kilometers per hour) and patrol vast distances without resurfacing. It can remain underwater for more than 40 hours with its rechargeable lithium energy system. Future stretched versions will be able to remain underwater for more than 70 days using modern energy sources.

In July, the vehicle demonstrated its shallow-water operational capability and recorded its first autonomous dive to 40 feet (12 meters) off California’s Catalina Island at USC’s Wrigley Marine Science Center. It subsequently maneuvered to a depth of





**PHOTOS: (Left)** The Echo Ranger crane team lowers the vehicle into the shallow cove. **(Insets, clockwise from top left)** Ross Peterson, Echo Ranger team lead, prepares the vehicle for lift; a rough terrain crane supports Echo Ranger pier-side launch and recovery operations; Echo Ranger is lowered into the water pier-side; lowering for in-water checks; the boat crew releases lifting slings from the vehicle; releasing the tow line in preparation for submerged operations; software engineer Ed Esguerra (from left), mechanical engineer Maurice Mejan and electrical/software engineer Scott Emerich monitor operations on board the support vessel; Emerich performs radio-frequency direction-finding checks on board the support vessel.

# Deep impact

400 feet (120 meters) while sending telemetry to Boeing engineers on surface tracking boats.

Then, in November, Echo Ranger performed acoustic testing off Catalina to record ambient noise in the ocean, such as that made by marine mammals and surface ships. The whale-shaped vehicle also participated in gamma-ray tests that collected and analyzed samples, looking for naturally occurring radioactivity in seawater.

“The world of unmanned, deep-dive submersibles with persistent assets is here, and Boeing is poised to be a major player,” said Ross Peterson, Echo Ranger program team lead. “We anticipate a day when Echo Ranger will be used routinely to patrol harbors or the nations’ waterways for security or to detect environmental hazards in the world’s oceans.” ■

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To see a video about Echo Ranger, visit <http://videos.web.boeing.com/video/965>







**PHOTOS: (Above)** A Boeing support crew watches Echo Ranger dive on its programmed mission. **(Insets, clockwise from top left)** Electrical/software engineer Scott Emerich, left, and software engineer Ed Esguerra observe Echo Ranger operations on control console displays; the boat crew watches Echo Ranger perform surface maneuvers before diving; Echo Ranger executes submerged shallow water transit; positioning to connect the tow line; the Echo Ranger tow line is passed to the line handler for pier-side lift and recovery; Jameson Garrett, business development manager, observes a test; after its dive, Echo Ranger is lowered onto the vehicle maintenance cart; systems engineer Brian Phelps and crane signalmen guide the submersible onto the cart.

# Not hurting,

Everett factory team has gone 10 years without a lost workday due to injury

By Joanna Pickup and photos by Gail Hanusa



It's late at night, very late in fact, and the usually busy factory in Everett, Wash., seems eerily quiet with only a thousand or so workers moving about the cavernous building.

Despite the hour, members of the third-shift 747 Program quality team have work to do.

From crawling inside the wings of a 747, to checking each rivet in the fuselage, to validating the electronic equipment inside the airplane, this team of quality inspectors must examine every part of the airplane, inside and out, in all its manufacturing positions.

The work itself is impressive—and physically demanding.

Challenges of the job aside, the team

members have worked together for the past 10 years without an injury resulting in a lost workday. They're among just a handful of groups across Boeing to have achieved such a record, including the transportation mechanics in Auburn, Wash., and the Defense, Space & Security site in Ogden, Utah.

Their secret?

"Although our safety procedures, manuals and tools have changed over the years, it's simple things such as stopping and looking before you do your work that can make the difference between getting hurt and staying injury-free," said Michael "Kale" Grisham, a final body join inspector.

Sitting in a conference room, the

bond among team members is easily seen. They laugh and joke with one another like old friends.

"We look out for each other," Grisham said. "We don't want to see anyone get hurt."

If they notice something that might be a safety hazard, they tell one another, said Jan Mathieson, a Seal, Test and Paint inspector. "It's a part of who we are."

The team believes situational awareness and moving smart are keys to staying safe.

"We have to be careful," said Rodolfo "Rudy" Narte, who works alongside Grisham. "Our jobs are dangerous, and since we move around the factory and throughout the airplane, we need to be extra alert. Everything is always changing."

# for certain!



The team also credits the leadership of its manager, Cathie Conley, for keeping its members safe.

"If we have a safety concern, we can go to her and she addresses the problem right then," said Danny Moser, an emergent tooling inspector. "We can ask questions and raise issues. Having an open culture really helps us stay safe."

Throughout the years, Conley has also recognized the team as it reached each milestone—a year with zero injury-related lost workdays, five years, nine years, and now, a decade.

"Going six months, even a year, without an injury resulting in a lost workday is something that should be recognized; 10 years is a major accomplishment," Conley said.

"Recognition helps to reinforce safety's importance and it's a chance to celebrate what the team has accomplished."

In addition to celebrating its own achievement, the team also supports Boeing's Safety Now initiative and the target to reduce the rate of injuries resulting in lost workdays at least 25 percent by 2013, and ultimately to zero.

"What a tremendous accomplishment, especially on third shift when the working environment, with line moves and various functional tests, can pose high safety risks," said Kevin Lennox, senior quality manager. "Many people think a team can't go 10 years without an injury resulting in a lost workday; this team shows what is possible."

Added Tony Blackner, Environment, Safety and Health director for the Everett site: "By looking out for each other and themselves, and reducing safety risks by getting things changed, the members of this group have clearly proved zero injury-related lost workdays can be achieved and sustained for a long, long time." ■

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**PHOTOS: (Clockwise from far left)** Performing inspections are 747 Program quality team members Dan Moser, Rebecca Wilke, Ray Eagleton, Jan Mathieson and Jim Ross; Dan Parks, left, works with the 767 Program's Mike Bevan to perform functional tests in the cockpit of a 767.

Global service—

# Texas style!

Employees at the San Antonio site take a 'One Boeing' approach to military and commercial work By Eric Fetters-Walp and photos by Bob Ferguson



**M**ost of the aircraft parked along the flight line at the Boeing San Antonio site wear unassuming military gray paint, so the 747-8s and 787 parked in a nearby hangar look a little out of place. But they're a sign of new opportunity for the Global Services & Support facility in Texas, which usually works on KC-135 Stratotankers and C-17 Globemaster III transport aircraft.

With dozens of 787s at the Commercial Airplanes' factory in Everett, Wash., awaiting refurbishment and change incorporation work, the 787 program needed more space and more help—and San Antonio was there to pitch in.

"We're physically constrained in Everett due to space and people," said Kevin Cooper, Commercial Airplanes' Flight Line Operations Support leader in Everett. San Antonio, an experienced maintenance, modifications and upgrades site for Boeing Defense, Space & Security programs, turned out to be an ideal second site for the work.

"We've proved the 'One Boeing' approach works," Cooper said. "This is a phenomenal team."

In November, San Antonio's 787 team paused to celebrate as the first Dreamliner completed at the site flew away to Everett ahead of its delivery to Japan Airlines. Last month, the site also completed one 747-8 Freighter. In all, six 787s and five 747-8 Freighters are scheduled to be completed in San Antonio by the end of 2013, though more could be added to that plan.

For three of the 787s, the work done in San Antonio is change incorporation, the process of configuring airplanes to the standards established by certification. That includes installing electronic and mechanical equipment, completing software

**PHOTO:** Manufacturing mechanics George Brown, left, and Hector Solano confirm work instructions for a 747-8 Freighter going through refurbishment at San Antonio. This airplane performed the new model's first flight in 2010.





upgrades, testing functional systems and flight control surfaces, and removing and reworking wiring or equipment that needs to be updated to current configuration requirements. The remaining three 787s are part of the flight-test fleet and are being refurbished to customer standards. The 747-8s that flew as part of the flight-test fleet likewise are being refurbished to customer standards, while other new 747-8s will undergo change incorporation work there.

In the case of the first flight-test 747-8 Freighter, for example, the work is extensive, as large amounts of flight-test equipment, gauges and related hardware had to be removed before the airplane could be refurbished. By the time it's finished, more than 7,000 pounds (3,200 kilograms) of wiring needed for testing activities will have been removed from the airplane, said Sam Losek, engine lead on the 747 program.

"It's almost taken down to the bare bones and built back up," Losek said.

The site next to Lackland Air Force Base has ramped up dramatically since early 2011 for its new work, with the rapid hiring of mechanics, training sessions and the arrival of tooling suited for the commercial airplane models. In all, Boeing added about 1,300 employees to San Antonio last year, more than doubling the site's workforce to about 2,800.

"It's been huge for the site, huge for the city and the county," said Scott Vieweg, Boeing Defense, Space & Security director of Commercial Programs at the site. "We've made a significant investment in the workforce here."

In December, the San Antonio site marked another milestone related to its commercial airplane work, when it was approved by the U.S. Federal Aviation Administration to be added to Boeing's Production Certificate 700 and was recognized as an Associate Facility by the FAA. The certificate allows Boeing to build and sell airplanes to an approved type design.

Chris Fenner, San Antonio's senior operations manager for the 787, said the site has blended commercial airplane work with



its military aircraft programs from the beginning. When Boeing took over the former air force base facilities in the late 1990s, the site performed three MD-11 passenger-to-freighter aircraft conversions. But the site's work until last year focused on maintaining and modifying large military aircraft, most notably the KC-135 Stratotanker and C-17 Globemaster III. The site also has maintained KC-10 tankers and modernized C-130s in the past.

For the KC-135 tankers, all of which are at least 45 years old, the site's crews strip the aerial refueling tankers of their paint, re-skin them with improved aluminum alloy, and repair and reseal other parts as needed. These aircraft, still critical to the U.S. armed forces, are then repainted before being sent back into service. The site also installs upgrades—modernized cockpits, improved landing gear, communications systems and related technology—on older tankers.

As with the KC-135, the large C-17 military transport aircraft come to San Antonio for periodic major maintenance, overhaul and upgrade work under the Globemaster III Sustainment Partnership with the U.S. Air Force. The site also installs special modifications for new C-17s coming off the production line in Long Beach, Calif.

Additionally, San Antonio is expected to see more military aircraft maintenance and modification work with the closure of Boeing's Wichita, Kan., site by the end of 2013.

For the latest commercial airplane work, Fenner said, about 10 percent of the site's existing workforce transferred from military aircraft programs, and the rest of the needed employees were hired with specific experience levels and special skills in mind.

"It's amazing how fast this crew got their talents up to speed on the aircraft," he said. "This, as well as our other programs, has proved the flexibility of the San Antonio workforce. It shows

**PHOTOS: (Below)** Today's flight line at Boeing San Antonio features military and commercial aircraft undergoing maintenance, modification and overhaul. **(Insets, clockwise from top left)** Lori DeArman, 747 manufacturing manager, coordinates with team lead Eddie Romero, center, and mechanic Rudy Ramirez; refurbishment of the first 747-8 at the site; Mike Straney, quality inspector, checks work; a C-17 engine.





we can take on any challenge.”

Jim Cruz, avionics lead technician for the 787, said he was surprised at the amount of software-driven components on the Dreamliner compared with the C-17 and other military aircraft on which he’s worked.

“Some of the things we usually do, we have had to unlearn,” Cruz said of old practices and tooling that don’t apply to the 787. Finishing the first 787 and getting it delivered back to Everett was an important milestone for the site, he said.

“It’s a relief and great feeling of accomplishment. Now we’re looking to apply what we’ve learned on the first one as we go forward,” Cruz said.

Jeremiah Ybarra, in-tank seal team lead mechanic on the 787 program, said the pace of work from the first 787 to the second one has increased dramatically. The U.S. Air Force veteran said he and his 21-person team pay special attention not to mar the 787’s unique composite skin as they climb inside and seal the airplane’s fuel tanks.

“With this plane, everything has to be perfect, so the teams are held to a high standard,” Ybarra said.

Cooper said the 787 and 747-8 change incorporation and refurbishment programs have shown what’s possible despite some of the practical concerns raised when the work expanded beyond Everett.

“There are logistical challenges when you’re thousands of miles away,” he said, adding that Everett and San Antonio worked well together. “I don’t think there was anything that we couldn’t do within 24 hours—in terms of getting tools, getting parts—despite the 1,700 miles (2,750 kilometers).”

Chris Porter, senior support leader for 787, said another early concern was bringing together BDS and Commercial Airplanes on the projects. But that hasn’t been a problem.

“It’s a working-together culture. There’s been a lot of willingness to come together around a problem as a team,” Porter said. “You couldn’t do this just as BDS or Commercial Airplanes. It’s really the partnership that made it possible.”

Lori DeArman, Commercial Airplanes manufacturing manager





for the 747 program, agreed that managers from both business units have worked together well since the admittedly quick and challenging increase in work since early 2011. She extended the same praise to mechanics and technicians.

"They've been great," she said. "I don't care if you're talking about the BDS full-time employees or contractors, the people are great. There's no lack of pride in workmanship."

Some of the necessary differences between working on military and commercial aircraft—mostly related to FAA inspections and having commercial customer representatives visit instead of military officials—have taken some getting used to, according to John Norton, 747 operations manager at San Antonio for BDS. For example, within weeks of the first 747-8 and 787 arriving, FAA inspections began on-site.

Pedro Crenshaw, flight-line operations analyst for the 747 program, who formerly worked on C-17s at San Antonio, was impressed with the 747-8's size. Crenshaw said it is important to make sure the commercial airplanes look as good as they operate when all the work is done.

Despite those physical differences, Timothy Anderson, an electrical mechanic on the 747 program who previously worked on rotorcraft in the U.S. Marines, said he and his co-workers have learned the past year that their skills are applicable to these new commercial airplanes.

"With each additional aircraft," Anderson said, "I think we're going to get faster and better." ■

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**PHOTOS: (Below)** A 747-8 Freighter is refurbished outside Boeing San Antonio's largest hangar; inside, KC-135s undergo maintenance. C-17 cargo aircraft, also serviced at the site, can be seen in the background. **(Insets, clockwise from top left)** Thankgod Maduabuchi, foreground, and Kenneth White refurbish the interior of a 787; Jim Cruz Jr. performs tasks in a 787; Oscar Menchaca, left, and 787 Operations Manager Dennis Watson address a modification requirement; John Schneider inspects an airplane wing.





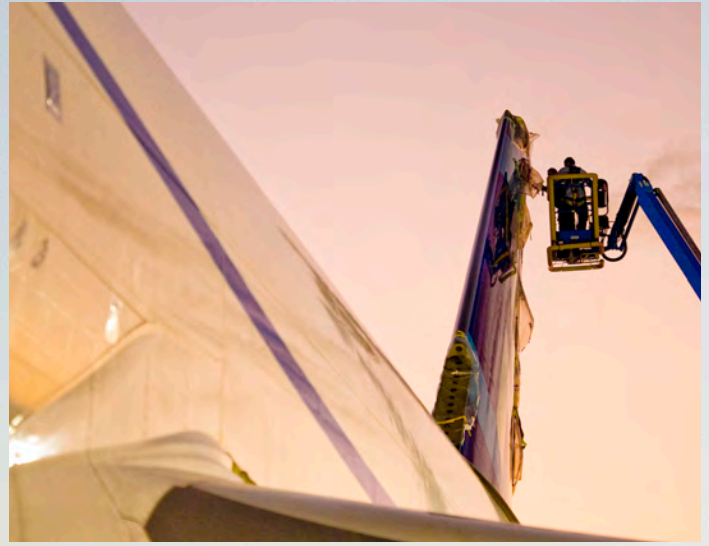
**PHOTOS: (Right)** As the sun sets on the San Antonio flight line, Boeing employees use a lift to perform maintenance on the vertical stabilizer of a C-17. **(Insets, clockwise from top left)** A C-17 and 747-8 Freighter undergoing maintenance and modification stand side by side on the Boeing San Antonio flight line; an employee performs refurbishment work inside a 747-8; a C-17 is overhauled in Boeing San Antonio's cavernous main hangar; a Boeing maintenance team employs a lift to access the tail of a C-17 Globemaster III.





**“This, as well as our other programs, has proved the flexibility of the San Antonio workforce. It shows we can take on any challenge.”**

*– Chris Fenner, San Antonio’s senior operations manager for the 787*



**PHOTOS: (Below)** Employees work under the lights on a 747-8 Freighter as the sun sets at Boeing San Antonio. **(Insets, clockwise from top left)** Tadesse Tegene reworks wiring inside a 747-8 Freighter undergoing refurbishment at Boeing's San Antonio site; using a lift to remove test sensors from the tail of a 747-8 Freighter; an employee looks over work instructions; Ian Anderson, left, and Brian Hundley work on the airplane.



**“It’s a working-together culture.  
There’s been a lot of willingness  
to come together around a  
problem as a team.”**

*– Chris Porter, senior support leader for the 787*



# Lasting impressions

*James Bell leaves a legacy of accomplishment following a career that spanned four decades* *By James Wallace*

It was his first day on the job, and with a long commute from the inner city of Los Angeles, James Bell made sure he arrived at North American Rockwell early. With time to spare, he walked to a nearby restaurant for breakfast, took a seat and waited to be served. And waited.

Finally, he left the restaurant and went to work—without breakfast.

Only later, through his experiences navigating a new landscape far less diverse than others he'd known, would Bell realize that not being served that morning might have had to do with the color of his skin.

Forty years later, James Bell is retiring from The Boeing Company, having risen to a position of leadership that would have seemed unimaginable to the young man just out of college that morning in 1972. He leaves as corporate president and chief financial officer of a global aerospace giant whose revenues last year hit \$68 billion.

Bell is the highest-ranking African-American employee in the company's history. But his legacy at Boeing transcends race and reflects a record of accomplishment, service and leadership that came during a time of significant change, as Boeing grew from a mostly commercial airplanes maker to one with a far more diverse portfolio of products and business. The workforce, too, is more diverse—and Bell has helped make it so. Equally passionate about education, he has enjoyed sharing his life experiences and mentoring others to become Boeing's leaders of tomorrow.

Bell also has set the example for ethical conduct. In fact, during a difficult transition

in the company's leadership, when Boeing needed not only a firm and steady hand to manage the business but someone with strong moral character, the board of directors asked Bell to lead the company through the crisis as president and chief executive.

"I look back on my life now and say, 'Who would have thought,'" Bell said in mid-January during an interview. "But it's not surprising, as my mother would say, because I showed up every day and did like my grandfather said—work for everything you get and [don't] expect anything. It's been an honest day's work for 40 years."

In early January, Bell and about 300 other Boeing executives gathered for the company's annual leadership meeting, where they help set the company's course for the coming year. This year's meeting included a tribute to Bell, during which co-workers spoke about their friend.

Among them was Jim McNerney, Boeing chairman, president and chief executive officer.

"There are lots of ways to describe James—great businessman, inspiring leader, devoted champion of diversity and leadership development, unquestionable fashion icon, relentless provocateur—and my friend and partner in running this company the past six and a half years," McNerney said.

He added that Bell leaves Boeing "a legacy that few can match. ... He is a role model for us all."

A video featuring Bell's mother and sisters was shown, in which they shared stories about Bell's childhood. The theme



**PHOTOS: (Above)** James Bell in front of his boyhood home in South Central Los Angeles. His mother still lives there.

COURTESY BELL FAMILY

**(Right)** James Bell, who started as an accountant in 1972, finished his Boeing career as corporate president and chief financial officer. BOB FERGUSON/BOEING

was how we are all shaped by the place we come from.

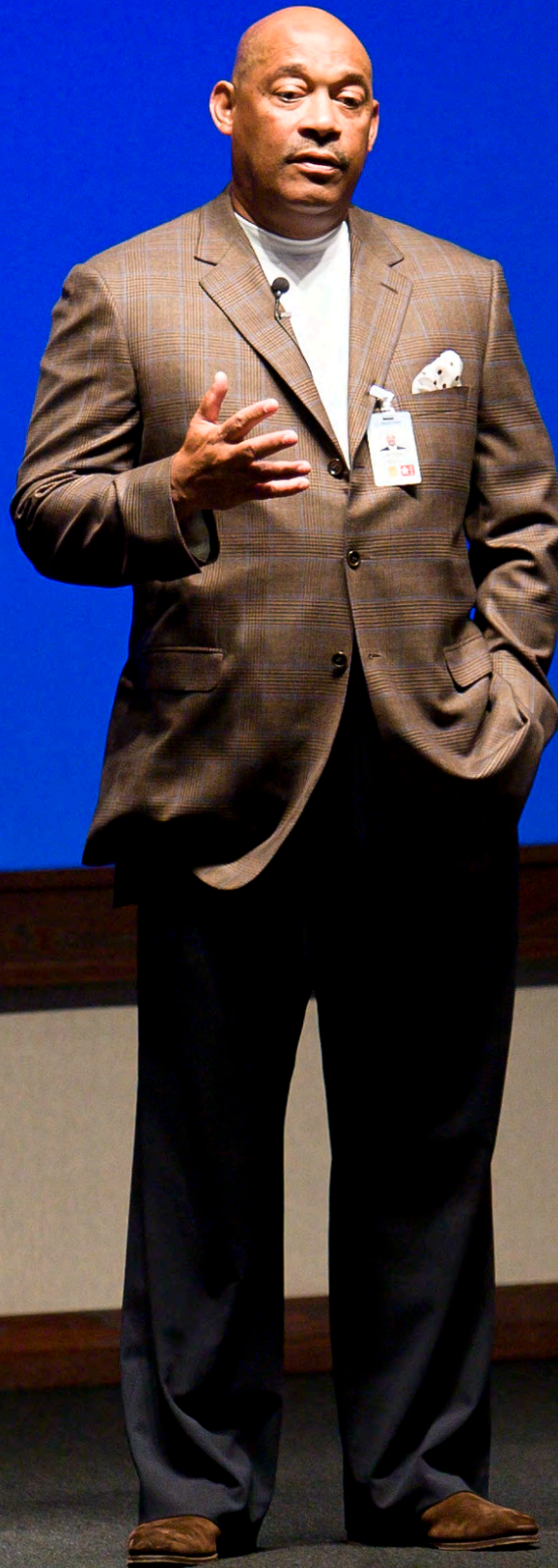
For James Bell, that place is South Central LA. His mother, Mamie, a former Los Angeles County government clerk, still lives in the same three-bedroom house where James, the youngest of four children, grew up.

Bell's father was a postman. But it was Bell's grandfather, his mother's dad, who played a special role in helping shape the boy and later the young man into the person he is today. The video showed Bell meeting with people such as civil rights

*"I have had a career beyond anything I could have imagined. I have met and become friends with people that I used to only read about, including the president of the United States. I have visited places that I used to see only on television or in books. And I have had the good fortune to be in a position to remember where I came from, and to give back."*

*- James Bell, from his commencement address to the June 2009 class at California State University at Los Angeles, his alma mater*





*“There are lots of ways to describe James — great businessman, inspiring leader, devoted champion of diversity and leadership development, unquestionable fashion icon, relentless provocateur — and my friend and partner in running this company the past six and a half years.”*

*— Jim McNerney, Boeing chairman, president and chief executive officer*



leader Jesse Jackson and President Barack Obama.

In a speech a few years ago to the Seattle chapter of the National Association of Black Accountants, Bell recalled how it was “not cool” where he grew up to be academically smart. “If you brought your books home to study, you were accused of ‘acting white’ and you might be ostracized by your peers,” Bell said.

But his family supported him and gave him the confidence to pursue his education.

“When I came home without books and claimed I did not have homework, my older brother and sisters, who understood my dilemma, would take me back to school and make me get my books,” Bell told the accountants. “Without an education, I would have been destined to remain in that neighborhood, constrained by the realities faced daily by the urban poor. Education was my freedom.”

During Bell’s junior year at Jefferson High School in 1965, the Watts neighborhood erupted in rioting after a black motorist was stopped and arrested by a white California Highway patrolman. It turned into one of the nation’s largest, most costly and bloodiest civil rights disturbances. Thirty-four people died, more than 1,000 were injured and more than 1,000 buildings were burned or destroyed.

The weeklong riots, which brought National Guard roadblocks and armed soldiers, had a profound effect on Bell.

“It got you more focused that the only way out was education.”

In his senior year at Jefferson, Bell was elected student body president. He ran for office because he wanted to make sure his high school “figured out how to keep the people that were in school, in school, and make them understand the importance of it.”

After high school, Bell attended California State University at Los Angeles. Bell would say later he chose to major in accounting because he figured it would teach him a skill that would lead to a job after graduation. And it did—with Rockwell. Bell was hired for an entry-level accounting position with what was then Rockwell’s Atomic International group in Canoga Park. What Bell didn’t know until months after he started

work was that his hiring was part of an affirmative action settlement. The company was required to hire an African-American in the accounting and finance department because of the government and military work.

Whatever apprehensions Bell’s co-workers might have had about him, he soon won them over with his strong work ethic, accounting aptitude and interpersonal skills. Bell worked at Rockwell for 24 years and held positions of increasing responsibility. Boeing acquired Rockwell’s aerospace and defense division in 1996. Before becoming vice president at the operating group level that year, Bell served as director of business management for the Space Station Electric Power Systems program at Boeing’s Rocketdyne unit.

“Extraordinary things are done every day and you meet astronauts,” Bell said, recalling his days with the space program. “You meet Neil Armstrong and you know him as a friend, and you say to yourself, Boy, this is pretty nice stuff to have worked on. ... The attention to detail, the integrity and the product, the quality that can take somebody to the moon and back ... our products were able to do that. We are privileged to work for The Boeing Company. And I thought that for my whole career.”

Bell was named acting chief financial officer of Boeing in November 2003. He was formally elected to the position in early 2004. In 2005, Bell added chief executive to his duties for several months following the resignation of Boeing’s top leader.

McNerney, during the tribute to Bell at the leadership meeting last month, noted how Bell had to pull double duty as both chief executive and chief financial officer under difficult circumstances.

Doing the right thing is not difficult, Bell said in the interview for this article, when asked about ethical conduct.

“You learn everything you need to know about it in kindergarten,” he said. “You know what’s right and you know what’s wrong.”

Leading people is just doing the right thing, Bell added.

A leader, he said, must be willing to do the things he or she asks others to do. Bell recalled asking his brother, a retired firefighter who had to send firemen into burning buildings, why his brother would go in, too.

“He would say, ‘Why would they go in if I just told them so?’ And I would say, ‘Because it’s their job.’ And he would say, ‘Well, that’s not enough. They have to feel

like the people they are supporting and working for will do the same thing.’”

In recent years, Bell has underscored the lack of diversity in corporate America, where blacks comprise less than 1 percent of the top executive jobs. In February 2004, shortly after the Boeing board elected him chief financial officer, Bell spoke at the company’s Seal Beach, Calif., site as part of Black History Month.

“Clearly, the company’s ability to address diversity at some level played a significant role in me standing before you today as chief financial officer of a Fortune 30 company,” Bell said.

It had been 32 years since he went to work that morning at Rockwell.

Throughout the years, Bell has collected many photographs of people and of moments that have been meaningful to him. Among the pictures on his office wall is the February 2005 cover of *Black Enterprise* magazine. The cover story was about the 75 most powerful blacks in corporate America, among them James Aaron Bell.

Bell will continue to be a high-profile business leader. He was recently voted onto the board at JPMorgan Chase and remains a director at Dow Chemical. He plans to stay active in the community, notably with the Chicago Urban League.

His retirement, though, has left Boeing with a big pair of shoes to fill.

Not only big shoes but expensive ones, as more than one friend has kidded Bell since he announced his retirement.

Bell has a well-earned reputation for his dapper dress. That comes from his family, Bell said.

“It may be one of those things that when you are not well off, the way people judge you is by how you look,” he explained. “You should always look presentable, as my mother and grandfather would say.”

Asked in what ways he has helped make Boeing a better place, a better company, Bell replied, “By example,” proving that people can come from humble beginnings as he did and succeed.

“It may have taken me longer, but I think now we have a culture where people who ... have different perspectives are valued and that people come to work excited, motivated and believing they can make a difference. Hopefully, I had something to do with having a culture that allows people to feel that way.” ■

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**PHOTO:** At the Boeing Leadership Meeting in Phoenix last month, Bell told friends and co-workers, “All I’ve ever tried to do was to make this company better, and I hope I have.” **BOB FERGUSON/BOEING**



# ‘This is exciting stuff!’

For Boeing’s Flight Operations team, 2011 was a year for the record books

By Adam Tischler

A small crowd had gathered inside Rod Skaar’s even smaller office in Seattle, spilling outside his door.

Skaar, assistant chief pilot for production, and Erick Hall, Flight Operations dispatcher, were poring over a flight-planning challenge with a handful of pilots and flight-test personnel looking on.

It was early December of last year. The Boeing Test & Evaluation crowd was sober and intense—until a voice just outside the office door broke the mood.

“This is exciting stuff!” exclaimed Mike Carriker, chief pilot for new airplane development.

The group that was gathered in and around the office paused for a moment to digest Carriker’s words. Just two years earlier, on Dec. 15, 2009, Carriker had commanded the 787 on its first flight. Now, the team was preparing to take the Dreamliner around the world and establish two world aviation records in the process. But in the rush of work to plan this complex trip, it was easy to lose track of the big picture in the details: They were about to



**PHOTOS: (Left)** Along for this flight near Mount Rainier in Washington state by a C-40A military transport aircraft is a Flight Operations T-38 chase plane. **MONICA WEHRI/BOEING**  
**(Insets, clockwise from top)** The Flight Operations dispatch office at Boeing Field in Seattle hums with activity. **MONICA WEHRI/BOEING** Engineering Test Pilot Mike Bryan looks inside a T-33. **MONICA WEHRI/BOEING** Test Bed Support Pilot Jim Pitcher and Chief Pilot for Military Tactical Dave Desmond fly in a King Air aircraft. **RON BOOKOUT/BOEING**

do something amazing, even historic.

For the Flight Operations team, that moment was emblematic of a year marked by incredible effort. The organization tallied 8,348 flights in 2011—913 more than in 2010—safely, efficiently and meeting the needs of its business partners.

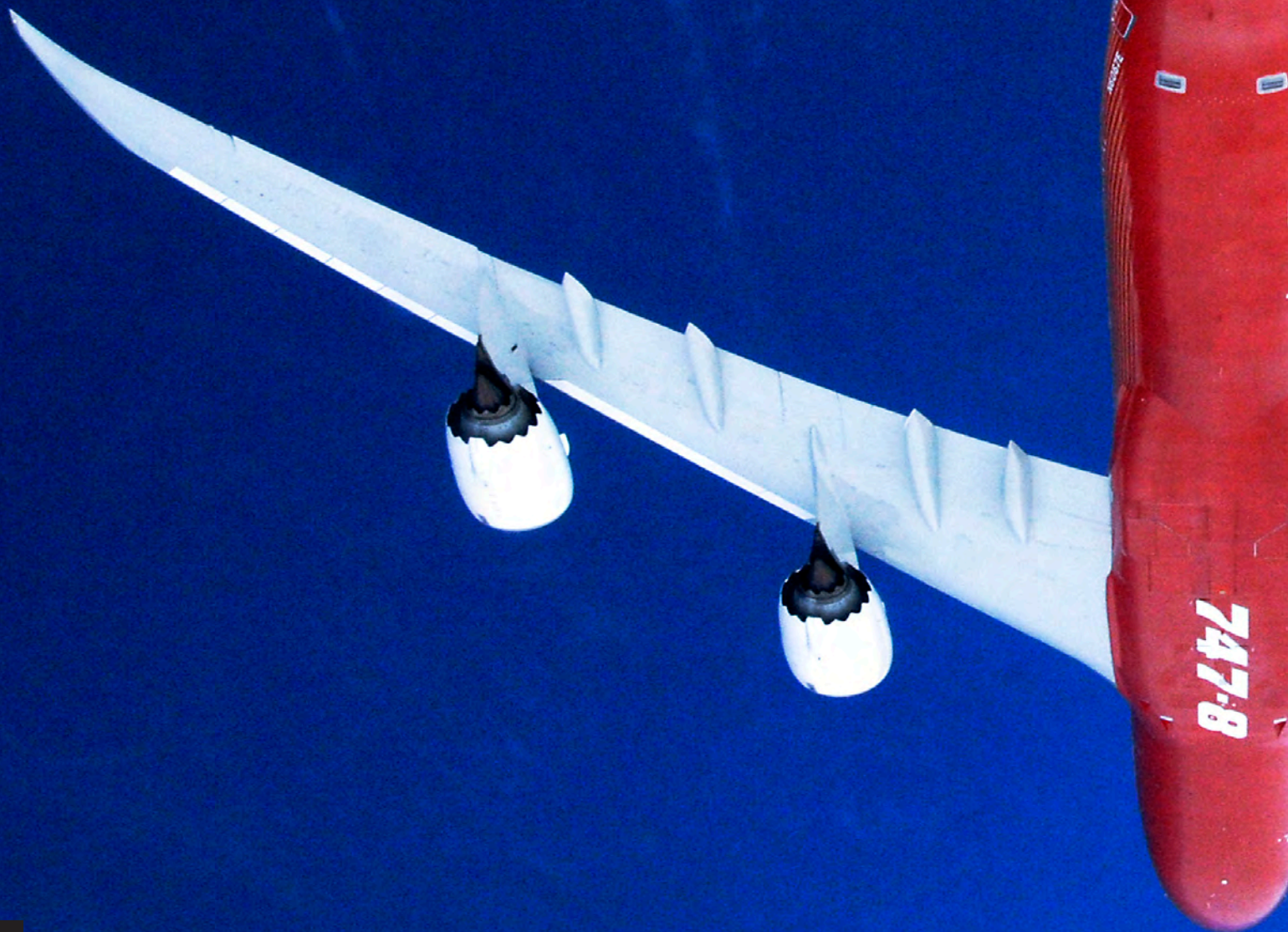
Boeing pilots took the controls of aircraft ranging from a single-engine tail-dragger to the F/A-18 and 747-8. Aircrews conducted operations in dozens of countries testing, demonstrating and delivering Boeing products.

There were multiple first model flights—the 747-8 Intercontinental, Apache Block III and P-8A. Boeing experimental aircraft took part in tests that demonstrated unparalleled efficiency and safety to program partners. All the while a steady stream of production aircraft came off of lines in Philadelphia, St. Louis, Mesa, Ariz., Long Beach, Calif., and in Renton and Everett, Wash. Every one of those aircraft went through a series of flight tests prior to delivery.

Aircrews and support personnel also worked to deliver and test tactical fighters, rotorcraft and military derivatives for customers around the globe.

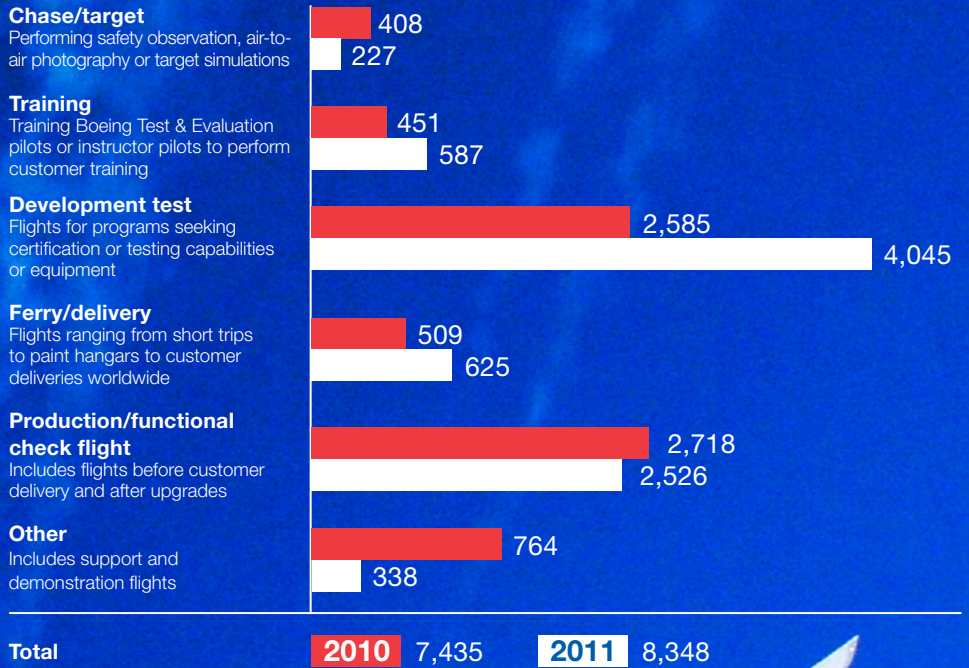
For commercial airplanes, derivative test flights and commercial airplane deliveries, Flight Operations dispatchers filed flight plans that ranged from long-distance fly-aways for international customers to elaborate 747-8 test flights across the continental United States, including one tracing a pattern cleverly designed to have the

**PHOTO:** Flight Operations conducted the flight tests that paved the way for the first 747-8 Freighter delivery in 2011. LEO DEJILLAS/BOEING



# What a great day to fly!

In 2011, Boeing Test & Evaluation's Flight Operations team took to the skies on 8,348 flights—or almost 23 times a day. That sum shattered the 2010 total of 7,435 flights. Here's a breakdown of the type of flights the organization handled in both 2010 and 2011.





747-8 Intercontinental fly over each of the contiguous 48 states.

And in early December, the Dreamliner took off from Seattle and returned a little more than 42 hours later — with a couple of world records in the bag. Hall, Skaar and the team from Boeing Test & Evaluation put together a figurative jigsaw puzzle of headings and altitudes in order to display the capabilities of the 787-8. The Dreamliner's record-setting flight path required 47 over-flight permissions from other countries.

When the 787 returned to Boeing Field it had flown the greatest distance of any airplane in its weight class, with a 10,710-nautical-mile (12,325-statute-mile, or 19,835-kilometer) trip between Seattle and Dhaka, Bangladesh, with credit for 10,337 nautical miles (11,896 statute miles, or 19,144 kilometers). This record had previously been held by the Airbus A330. The 787 also had made the fastest trip around the world (eastbound) in its weight class.

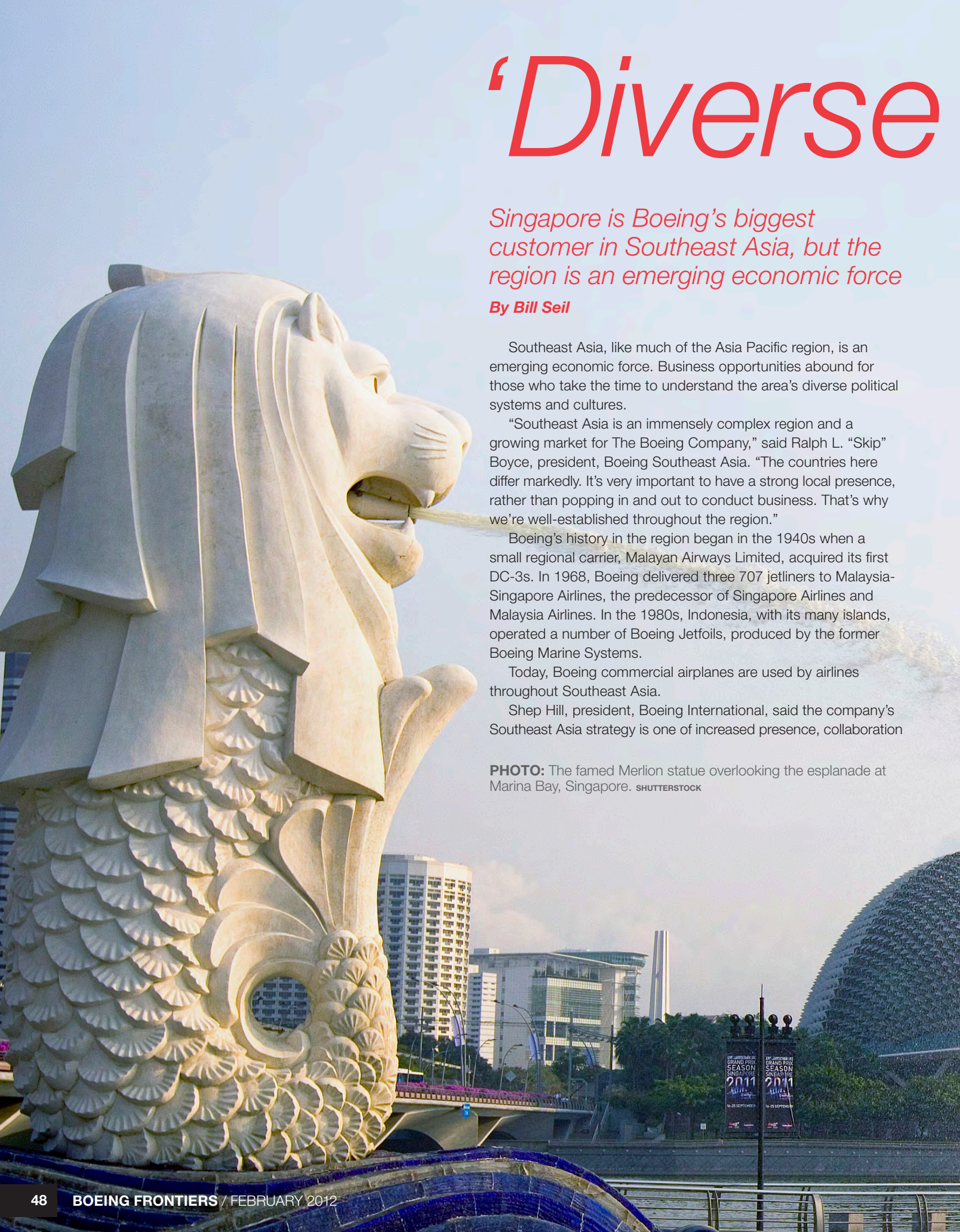
And despite the flight planning challenges, everything had gone to plan, thanks to a superb effort by Skaar, Hall and the team of pilots and flight-test personnel.

It was a story that, on many levels, played out more than 8,300 times in Flight Operations, Boeing Test & Evaluation, in 2011. ■

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**PHOTO:** A 787 Dreamliner flies over the Oregon coast in the United States during a test flight. **ED TURNER/BOEING**





# 'Diverse

*Singapore is Boeing's biggest customer in Southeast Asia, but the region is an emerging economic force*

**By Bill Seil**

Southeast Asia, like much of the Asia Pacific region, is an emerging economic force. Business opportunities abound for those who take the time to understand the area's diverse political systems and cultures.

"Southeast Asia is an immensely complex region and a growing market for The Boeing Company," said Ralph L. "Skip" Boyce, president, Boeing Southeast Asia. "The countries here differ markedly. It's very important to have a strong local presence, rather than popping in and out to conduct business. That's why we're well-established throughout the region."

Boeing's history in the region began in the 1940s when a small regional carrier, Malayan Airways Limited, acquired its first DC-3s. In 1968, Boeing delivered three 707 jetliners to Malaysia-Singapore Airlines, the predecessor of Singapore Airlines and Malaysia Airlines. In the 1980s, Indonesia, with its many islands, operated a number of Boeing Jetfoils, produced by the former Boeing Marine Systems.

Today, Boeing commercial airplanes are used by airlines throughout Southeast Asia.

Shep Hill, president, Boeing International, said the company's Southeast Asia strategy is one of increased presence, collaboration

**PHOTO:** The famed Merlion statue overlooking the esplanade at Marina Bay, Singapore. SHUTTERSTOCK



# *and dynamic'*

and partnership. This, of course, varies from country to country. Boeing has a number of customers for commercial airplanes and defense products in the region. The company is building economic development relationships and has an active corporate citizenship program across the region.

"Southeast Asia is a region that has a significant and growing impact on The Boeing Company," Hill said. "It's already an important market, and there are growing opportunities for both commercial and military products."

Boyce, who has served as U.S. ambassador to both Thailand and Indonesia, works out of the Boeing International office in Singapore and a Boeing office in Kuala Lumpur, Malaysia. Singapore Airlines, or SIA, is one of the largest Boeing 777 customers. In total, SIA has ordered 85 Boeing 777s, 27 of which are 777-300ERs (Extended Range). The nation's military is a customer for the Boeing AH-64D Apache helicopter, the F-15SG fighter and the Insitu ScanEagle autonomous unmanned aircraft system.

"Singapore has a reputation for due diligence that is respected not just in the region but around the world," Boyce said. "If Singapore buys a defense product, that purchase is recognized as a stamp of approval."

In all, Boeing employs about 150 people in Singapore, including those working at the company's Training and Flight Services Center near the Changi International Airport. The facility serves as the company's Asia Pacific training headquarters. It features two 787 training suites and six simulators for 737, 777, 787 and A320 airplanes.

Boeing's Integrated Material Management Asia Regional

Center provides around-the-clock spare parts inventory to global airline customers and network suppliers. The center is located at the Airport Logistic Park of Singapore, where Boeing also maintains a regional spares distribution center.

Two Boeing subsidiaries have offices in Singapore. Aviall operates out of Loyang and Jeppesen operates out of Tanjong Pagar. Boeing also has Commercial Airplanes field service representatives and F-15 support personnel based in Singapore.

In addition to Singapore and Malaysia, Southeast Asia's diverse mix of countries includes Indonesia, Thailand, Vietnam, the Philippines, Cambodia, Laos, Brunei and Burma.

Indonesia's Lion Air has become one of the largest and most aggressive airlines in the region's rapidly growing low-cost carrier market. It is the world's largest operator of the 737-900ER. In November 2011, Lion Air signed a commitment to order 201 737 MAXs and 29 more 737-900ERs.

To some degree, the region's 10 nations resolve issues of common concern through the Association of Southeast Asian Nations, and Boeing maintains strong ties with this organization. But there is no substitute for understanding each nation on an individual basis, according to Hill and Boyce.

Boeing's investment in Southeast Asia includes business alliances, charitable programs and support for local aerospace development. The company is a regular participant in the Singapore Airshow, scheduled for this month, which is among the world's top aviation events and the largest aerospace and defense exposition in Asia.

"The Singapore Airshow is a tremendous opportunity for us





*“Southeast Asia is an immensely complex region and a growing market for The Boeing Company.”*

*– Ralph L. “Skip” Boyce, president, Boeing Southeast Asia*

to show our face and network with our customers and others in the aerospace industry,” Boyce said. The air show happens every two years.

The company’s support for local aerospace activity is year-round.

In Singapore, Boeing is engaged in research and development work with the Agency for Science, Technology and Research, which fosters world-class scientific research and talent. The organization supports key industries, including aerospace, by collaborating with international partners. It is currently involved in a range of research and development areas, including advanced materials, computational science and wireless communications.

Boeing is also involved in a joint venture in Malaysia called Asian Composites Manufacturing, or ACM, which supplies composite materials and subassemblies to the global aerospace industry. This includes support for all of Boeing’s commercial airplane programs, including the 747-8 and 787 programs. ACM supplies the Next-Generation 737 program with

aileron panels and components. In 2008, it was selected to provide the machined honeycomb core for the 777 elevator and rudder.

Also in Malaysia, Malaysia Airlines Engineering and Aviation Partners Boeing operate a modification and installation center for Blended Winglets, the first such facility in Southeast Asia. Boeing has two suppliers in Vietnam. Mitsubishi Heavy Industries Aerospace Vietnam produces 737 wing flaps. Nikkiso Vietnam produces composite detail parts, including 777 blocker doors.

Overall, Southeast Asia has experienced a surge of aerospace manufacturing in recent years. In the past three years alone, Boeing suppliers have opened new aerospace factories in five countries within the region.

“It’s a great place to be,” Boyce said. “And for those of us who work here, it’s exciting to participate in the growth of this diverse and dynamic region.” ■

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**PHOTOS: (Left)** The Bitexco Financial Tower, with its signature helipad, stands high above Ho Chi Minh City in Vietnam. **SHUTTERSTOCK (Insets, from left)** Skip Boyce, president of Boeing Southeast Asia, shown in Singapore. **KENNETH SIM** A Republic of Singapore Air Force F-15SG fighter. **U.S. AIR FORCE** A Republic of Singapore AH-64D Apache. **BOEING**





## Singapore leads a growing Southeast Asian defense market

Singapore has long been Boeing's primary customer for military products in Southeast Asia. But business opportunities are emerging elsewhere in the region, especially for products supporting humanitarian assistance and disaster relief.

Sales of military products to individual Southeast Asian countries are limited by U.S. government export restrictions. But certain products, such as the CH-47 Chinook helicopter, are ideally suited to reaching people in need of help.

"Natural disasters are frequent occurrences in Southeast Asia, so disaster relief and humanitarian assistance are of vital importance," said Joe Song, regional director, Asia Pacific International Business Development, Boeing Defense, Space & Security. "Time after time, aircraft like the C-17 and CH-47 have proved their value in emergency situations. While not every country can afford a C-17, Chinooks are another story."

Among the countries in this region, Singapore has been able to consistently modernize its armed forces over the years. The Republic of Singapore's air force and navy are customers for Boeing products.

"Singapore is a small island, yet it has an economy that puts it on par with the wealthiest countries in the world," said Skip Boyce, president, Boeing Southeast Asia.

Singapore was the first country in Southeast Asia to select the AH-64D Apache. In 2005, Singapore purchased F-15SG fighters, which was supplemented by an additional order in 2007. Through its Global Services & Support business, Boeing provides a range of support services for Singapore's Apache and F-15 fleets. Boeing is also part of an international team providing training for Republic of Singapore fighter pilots.

"When Singapore buys something, it sends a message throughout Southeast

Asia and the world," Song said. "They're a very sophisticated and thorough customer, and everybody knows they buy the best."

Boeing Defense, Space & Security is in discussions with Singapore about other Boeing products, Song said. Cybersecurity is an emerging area of collaboration.

Dick Hutchinson, director, Southeast Asia international business development, said Southeast Asia can make a strong contribution to the BDS goal of growing export sales to 25–30 percent of overall revenue by 2013.

"BDS supports some very important, savvy customers in Southeast Asia and we are equipping them with enhanced and affordable capabilities," Hutchinson said. "It's a win-win opportunity both for the company and our customers."

In 1993, the Royal Malaysian Air Force ordered eight F/A-18D Hornets, which are still in service and supported by Boeing. Today, Boeing is hoping to meet Malaysia's need for a multi-role combat aircraft with the F/A-18E/F Super Hornet.

"Malaysia is a country in transformation," Song said. "It's rich in natural resources."

He noted that much of the world's commerce goes through the Strait of Malacca, which is off the shore of both Singapore and Malaysia. "The United States has a strong interest in making sure that this very important shipping lane stays safe and well protected," Song said.

Boeing sees a growing opportunity for the sale of BDS products to Southeast Asia, Song said, noting that as local economies grow, individual nations will need products that strengthen security and improve their ability to respond to emergencies.

"Over the next decade, we expect to be doing a lot more business in Southeast Asia," Song said. "While restrictions vary by country, a majority have potential for BDS sales."

– Bill Seil



## Commercial air travel spurred by economic growth

Southeast Asia's economic growth and unique geography are creating an increased demand for air travel, especially in the low-cost carrier market.

About 60 percent of the commercial airplanes flying in Southeast Asia are Boeing products, according to Dinesh Keskar, vice president, Sales, Asia Pacific and India, Boeing Commercial Airplanes. But competition is keen, and the company is focused on meeting the needs of this changing market.

"Increasing gross domestic product is driving much of this growth," Keskar said. "At the same time, the people of Southeast Asia are becoming better educated and using that education to grow their economies and improve their lives. So there is growth in both business traffic and leisure travel to match their changing lifestyles."

Boeing's Current Market Outlook

forecasts that Southeast Asian air travel—to, from and within the region—will grow at an average annual rate of 6.8 percent over the next 20 years. Intraregional traffic alone is expected to grow at a rate of 7.4 percent per year. Over that period, Boeing forecasts a market for 2,750 commercial airplanes.

Indonesia's Lion Air, one of the largest and fastest-growing low-cost carriers in Southeast Asia, is among the airlines preparing for increased traffic. In November 2011, it signed a commitment to order 201 of the 737 MAX that is in development, and 29 Next-Generation 737-900ERs (Extended Range). The agreement included purchase rights for an additional 150 airplanes. The \$21.7 billion deal, when finalized, will be the largest commercial airplane order ever for Boeing, by both dollar volume and total number of airplanes.

In addition, the Jakarta-based airline has ordered 166 Boeing 737-900ER jetliners,

**PHOTOS: (Below)** The Petronas Towers in Kuala Lumpur, Malaysia, are the world's tallest twin buildings. SHUTTERSTOCK

**GRAPHICS: (From left)** A Vietnam Airlines 787-8; Thai Airways 777-300ER (Extended Range); Singapore Airlines 787-9; and Lion Air 737 MAX. BOEING

making it the world's largest operator of that model.

Singapore Airlines (SIA) is Boeing's biggest customer in the area, and has one of the largest Boeing 777 fleets in the world. Overall, SIA has ordered 85 Boeing 777s, 27 of which are 777-300ERs. Other major Boeing customers in the region include Malaysia Airlines, based in Malaysia; Garuda Indonesia, based in Indonesia; Thai Airways and Nok Air, based in Thailand; Vietnam Airways, based in Vietnam; and Philippine Airlines, based in the Philippines. Boeing also has a strong relationship with BOC Aviation, a Singapore-based airplane leasing company, which to date has ordered 64 Boeing airplanes.

"We've had tremendous success with both the 777 and 787 in this region," Keskar said. "These are the most efficient long-haul airplanes operating today, and we expect that success to continue. And

now the 737 has recently gained excellent momentum in Southeast Asia's single-aisle market, with even more significant upside potential due to the rapid growth of low-cost carriers."

Separation by water and long distances is common throughout much of Southeast Asia, and the low-cost carrier model is expected to spread among other growing economies. While low-cost carriers handled approximately 1 percent of Southeast Asia's commercial air traffic in 2000, they are expected to handle more than 25 percent of the passenger traffic by 2020. Keskar believes the launch of the 737 MAX will make Boeing a particularly strong competitor in this market.

Boeing Capital Corporation has been active with Southeast Asia's banks and leasing companies to ensure financing support for the company's airline customers, said Foster Arata, vice

president of BCC's Asia and Greater China region team.

"We routinely meet with the region's financiers," Arata said, "to discuss ways we can each work together to take advantage of the banks, capital market and leasing company strengths to assist in arranging finance for our customers, not only in Southeast Asia but for airlines and lessors all over the world."

A number of other factors are supporting the growth of Southeast Asian airlines, Keskar said, including liberalization that is contributing to increased international travel.

The growth of commercial aviation in Southeast Asia, he added, is good for the people of that region—and for Boeing.

"It's really a great success story that we hope will continue for a long, long time."

— Bill Seil



## Airlines of Southeast Asia

### Thai Airways

Headquarters: Bangkok  
Fleet: 93 airplanes, including 18 747-400s, 27 777s, five 737-400s, 13 A300s and 30 A330/A340s  
Notable: Flag carrier of Thailand has 58 airplanes on order, including 14 777-300ERs (Extended Range) and eight 787s

### Singapore Airlines

Headquarters: Singapore  
Fleet: 106 airplanes, including 66 777s, 12 A380s and 19 A330s  
Notable: 62 twin-aisle airplanes on order, including 20 787-9s and seven A380s

### Lion Air

Headquarters: Jakarta  
Fleet: 65 airplanes, including 54 737-900ERs  
Notable: Was launch customer for the 737-900ER; has 124 Next-Generation 737s on firm order, with a commitment for an additional 29 737-900ERs and 201 737-9 MAXs; and is the largest 737-900ER customer

### Vietnam Airlines

Headquarters: Hanoi  
Fleet: 69 airplanes, including 10 777s, 35 A320/321s and nine A330s  
Notable: 60 airplanes on order, including 16 787s; serves 46 cities, with 315 daily flights

### Nok Air

Headquarters: Bangkok  
Fleet: 13 airplanes, including 12 737s  
Notable: Eight 737s on order; Nok Air is the budget airline of Thai Airways

### Malaysia Airlines

Headquarters: Kuala Lumpur  
Fleet: 94 airplanes, including 51 737s, 17 777s, 10 747s and 16 A330s  
Notable: 57 airplanes on order, including 40 737-800s and six A380s; serves 48 countries, with 506 daily flights

### Garuda Indonesia

Headquarters: Jakarta  
Fleet: 85 airplanes, including 70 737s, three 747-400s and 12 A330s  
Notable: 56 airplanes on order, including 10 737s and 10 777-300ERs

### Philippine Airlines

Headquarters: Manila  
Fleet: 45 airplanes, including five 747-400s and two 777-300ERs  
Notable: Four 777-300ERs on order; serves 60 destinations, with 283 daily flights

### BOC Aviation

Headquarters: Singapore  
Fleet: 156 owned airplanes, including 66 Next-Generation 737s and 15 777s  
Notable: Leasing company (formerly known as SALE) owned by Bank of China; eight 777-300ERs on order that will be placed with THAI

## Charitable contributions support many programs

Boeing's corporate citizenship contributions in Southeast Asia range from humanitarian aid to victims of human trafficking to programs that bring technology education to local schools.

The civic and charitable needs of each country vary widely, said Skip Boyce, president, Boeing Southeast Asia.

"Many of the programs we support are aimed at helping people in difficult or even tragic circumstances to develop their sense of self-worth, turn their lives around and become productive members of their communities," Boyce said. "It's more than helping people; it's about giving them a future."

Through its charitable and business contributions, Boeing provides funds that will help a variety of programs and services in six countries become self-sustaining.

One such program is the Hagar International, which offers assistance, education and vocational training to the victims of cross-border human trafficking. Boeing has supported Hagar International since 2009.

"Hagar is an amazing enterprise that reaches out to people whose lives have been severely affected," Boyce said. "It helps them to get their lives together and develop meaningful careers. Hagar has brought about some remarkable transformations."



Halina Ibrahim, who is based in Kuala Lumpur, Malaysia, and is Boeing's global corporate citizenship representative for the region, said the Hagar program generally emphasizes organizations that support health and human services, education, and the environment.

"Some of the best programs are those that bring about a clear change in individual lives," Ibrahim said. "They get children into classrooms and introduce them to the joy of learning. They help abused women to find their own voices and gain the strength to move on. They allow teachers to develop special skills so they can teach underprivileged children."

This philosophy is reflected in Boeing's citizenship investments in countries throughout the region:

**Thailand** – Boeing has partnered with Kenan Foundation Asia to help train school principals, teachers and students

about using technology in the classroom for math and science.

**Malaysia** – Boeing supports the Malaysian Cancer Education and Research Project in providing the community with cancer information, education and support. The company is also involved in programs that provide kidney dialysis in rural areas, as well as disaster relief.

**Cambodia and Laos** – The company supports the Digital Divide Data program, which provides job training and employment to disadvantaged youth. They are given jobs that involve scanning documents, newspapers, textbooks and other materials for universities around the world.

**Indonesia** – Boeing works with the Friends of the National Park Foundation, which is involved in restoring natural areas, including the country's many forests. Boeing also supports the Nature Conservancy's

Berau Forest Carbon Program, a large-scale project in Borneo, which protects one of the most critical rain-forest areas in the world.

**Vietnam** – In 2010, the country presented Boeing and the Vietnam Veterans of America Foundation with a humanitarian award for contributions made to Vietnam's ethnic minorities. This included assistance in building and refurbishing elementary schools in 12 rural provinces throughout Vietnam.

"The needs of the people of Southeast Asia are as diverse as the region itself," Boyce said. "Through considerable effort, we've found outstanding partners who are positioned to make a difference for years to come."

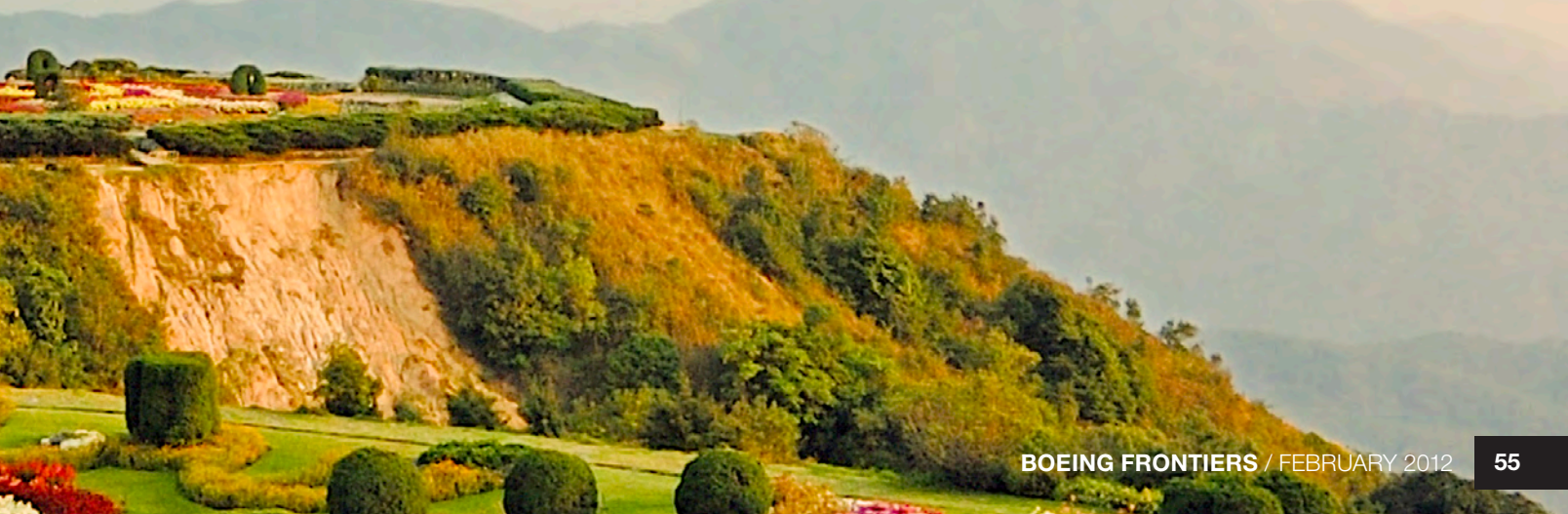
– Bill Seil



*"Some of the best programs are those that bring about a clear change in individual lives."*

– Halina Ibrahim, Boeing Global Corporate Citizenship representative for Southeast Asia

**PHOTOS: (Left)** The two structures known as the Napapon Phoom-siri Chedi, located near the summit of Doi Inthanon, Thailand's highest mountain. **SHUTTERSTOCK (Insets, from left)** Hagar International trains women in areas such as catering and facilities management, as well as apparel and accessories manufacturing (next photo), in Phnom Penh, Cambodia. **HAGAR INTERNATIONAL** Workers collect seeds to prepare for tree planting in Kalimantan, Indonesia. **FRIENDS OF THE NATIONAL PARK FOUNDATION** Students in traditional Hmong dress await an opening ceremony at a new school in Vietnam. **VIETNAM VETERANS OF AMERICA FOUNDATION** Skip Boyce, Boeing Southeast Asia president, visits with students as part of the Boeing-Kenan One Computer Classroom project in Thailand. **HALINA IBRAHIM/BOEING**



# Leader of the pack

Team develops environmental standards that cut shipping costs and waste

By Patrick Summers

**T**he thousands of packages and crates that move through shipping and receiving every day at Boeing are increasingly noteworthy for what they don't contain: tons of unnecessary material that would end up in landfills and cost the company millions of dollars each year.

"The amount of waste we can eliminate and money we can save with better-designed containers and a more efficient shipping process is a real eye-opener," said Casey Steiner, a specialist in the Product Standards Office, Boeing Research & Technology.

Steiner leads a team in Engineering, Operations & Technology that developed new requirements for all packages shipped to, from and inside Boeing. The requirements are spelled out in a single supplier packaging standard that is now part of every new Boeing purchase order.

The standard covers details such as container size, labeling, and the amount and type of allowable packaging material. The requirements also embody industry and environmental best practices developed over several years of collaboration among Boeing packaging engineers, conservation experts and suppliers.

"Working directly with suppliers is key to eliminating packaging waste before it gets in the door," said Suzanne Riney, Environment, Health and Safety project leader. "Designing the new packaging requirements was an ideal opportunity to be proactive in our efforts to reduce, reuse and recycle waste."

From January 2009 to October 2011, the improvements saved Boeing an estimated \$5.7 million, primarily in avoided packaging costs, and eliminated 1.7 million pounds (770,000 kilograms) of waste from shipping and receiving work flows.

These benefits will grow as older purchase orders expire and are replaced with contracts containing the stricter packaging standard.

The process to update packaging practices began when Steiner's team in Boeing Operations took on the job of standardizing the company's supplier packaging requirements, which involved consolidating several hundred different standards.

At the same time, Riney and Environment, Health and Safety worked with suppliers to redesign packaging material and identify and reduce shipping waste. The teams worked

together to bring all of the identified environmental best practices into a single standard.

The next step was to prove the new packaging requirements could produce the intended cost savings and environmental benefits. Steiner's team chose the Super Hornet program in St. Louis as a pilot project. In August 2010, the team led a workshop that used Lean+ continuous improvement principles to demonstrate how the new packaging standard could be implemented.

Boeing experts in manufacturing, quality and conservation joined Super Hornet suppliers in the workshop. "It gave everybody a better idea of the volume of material and types of packaging we face every day," said Steve Pallardy, St. Louis site shipping manager.

With the workshop's assistance and the new packaging standard, improvements in Super Hornet shipping and receiving include:

- 30 percent less packaging waste sent to landfills
- Approximately 900 new reusable containers—a 300 percent increase
- 90 percent elimination of quality defects caused by improper packaging
- 65 percent increase in the amount of recycled packaging

After the workshop, Steiner's team and Environment, Health and Safety brought together packaging engineers from 19 Boeing sites around the company to share its successes, the new packaging standard and other environmental best practices. Each site developed an improvement plan to help reach the goal of eliminating all packaging waste sent to landfills.

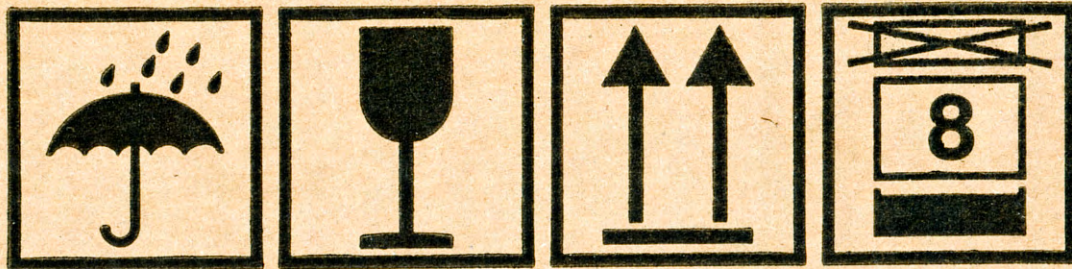
Boeing recognized the achievements of the Operation's project team with a 2010 Conservation Award.

For Steiner, the team's success also brings personal satisfaction: "It's a passion around the environment and wanting to find a way to make a difference. It's a good feeling and I know a lot of other people involved feel the same way." ■

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*For more information on Boeing's recycling and waste reduction efforts, employees can visit the Environment Information Center at <http://environment.web.boeing.com> on the Boeing intranet.*





**“Working directly with suppliers is key to eliminating packaging waste before it gets in the door.”**

– Suzanne Riney, Environment, Health and Safety project leader

**PHOTOS: (Clockwise from top)** Shipping facilitators Kenny Bosik, from left, and Kirk Tsuji, and supply chain specialist Lon De Neui load interior panels for a 747-400 Converted Freighter into containers that use 50 percent less lumber and plywood. **MARIAN LOCKHART/BOEING** Latasha Hill, support coordinator, and Elvin Woods, material handler, ship items for the Super Hornet in reusable cardboard and plastic containers. **RICHARD RAU/BOEING**





# The **next** generation

Engineers introduce students to the excitement of science and technology

By Bill Seil

**B**oeing engineer Cindy Stong will never forget a presentation she was given on nanotechnology. It was delivered by a 6-year-old boy—who introduced it with a song.

Stong, a project manager in the Lean organization at the company's Mesa, Ariz., site, said the unusual encounter occurred when she was serving as a judge in a junior technology competition.

"I went up to him and said, 'Tell me about your project,'" Stong recalled. "At that point he turned his back to me and then, all of a sudden, he spun around and had this cute little song introducing his presentation. It was one of the most amazing things I'd ever witnessed. When his song was over, he explained the whole concept of nanotechnology—and he was only 6!"

Many Boeing employees volunteer in science, technology, engineering and mathematics—or "STEM"—activities, which encourage students to consider careers in these fields through hands-on problem solving. Volunteering enhances personal development and is a rewarding experience, according to employees who take part in these activities. It also plays an important role in strengthening the future of Boeing and

engineering-based industries such as aerospace.

"I'm inspired to see that our engineers and technical population volunteer in STEM outreach activities, because their efforts are cultivating new generations of

engineers and scientists and also making our communities better places to live," said John Tracy, Boeing chief technology officer and senior vice president of Engineering, Operations & Technology. "There are a lot of exciting and important technology and engineering discoveries yet to be made. If we reach out to young people, we might just inspire someone who will make these discoveries in the future."

Statistics and demographic trends in the United States indicate the demand for employees who have the skills needed by high-tech industries could outpace the supply, especially as today's baby boomers retire. STEM occupations are projected to grow by 17 percent from 2008 to 2018, compared with 9.8 percent growth

**“If we reach out to young people, we might just inspire someone who will make discoveries in the future.”**

*— John Tracy, Boeing chief technology officer and senior vice president of Engineering, Operations & Technology*



**PHOTOS: (From far left)** Boeing’s Cindy Stong, left, meets with Lou Patrick, a student at Salt River High School, Scottsdale, Ariz., to review progress on his competition robot for the First Lego League Regional Tournament, part of the FIRST Robotics program. **MIKE GOETTINGS/BOEING** Boeing employees Erika Porter, left, and Nicole Stack prepare student instruction material. Stack volunteers in the After School Math and Science program. **JOHN CROZIER/BOEING**

for non-STEM occupations, according to U.S. government data. Meanwhile, the data also show that of the 3.7 million students who enter kindergarten each year, only about 67,000 will end up earning a four-year college degree in engineering.

The need to maintain a workforce with the right skills is especially critical in aerospace, where the average U.S. aerospace worker is about 45 years old—meaning a sizable portion of employees are relatively near retirement age. And many U.S. defense industry programs can employ only American citizens.

In the United States, Feb. 19–25 is National Engineers Week, an annual cross-industry celebration of the contribution of engineers to society. This year’s theme is “7 Billion Dreams,” which relates to the potential of engineers to inspire great ideas in every person in the world.

Stong’s primary volunteer activity is serving as a chief judge adviser in the FIRST (For Inspiration and Recognition of Science and Technology) Robotics program, which allows high school students to build robots from kits and compete against

one another. She also judges the program’s junior competition, which begins at age 6. Each student team has a mentor.

“I’ve heard of mentors being in tears when they’ve dumped out their kit of robot parts to begin work,” Stong said. “When you first see the parts, it’s an overwhelming jumble with no instructions. And each team has to have a functioning, drivable, working robot in just six weeks. But it also gives you goose bumps because you’re seeing some of the smartest kids in the world working to succeed.”

Jeff Hunt, a Technical Fellow in Boeing Research & Technology, El Segundo, Calif., first became interested in working with students in the 1970s when he was a teaching assistant at the Massachusetts Institute of Technology (MIT). He remembers answering a request from a young student in Ohio by sending her a worn-out helium-neon laser tube. Six months later, she sent him a newspaper article that said she had won her local science fair.

Hunt became more active in STEM outreach after joining Boeing. When, more than a decade ago, he was contacted by MIT to serve as an education counselor to high school students,



**PHOTO:** Jeff Hunt, a Boeing Technical Fellow, discusses the iGen program with students at the John H. Francis Polytechnic High School in Sun Valley, Calif. The program uses a fun, safe, Web-based environment to inspire students to become engineers and scientists, getting them involved in hands-on projects. PAUL PINNER/BOEING

he agreed—on the condition that he work with students from lower socioeconomic backgrounds. Having grown up in New Jersey in a blue-collar family, Hunt wanted to provide the same kind of motivation and encouragement he had received from his high school science teacher.

MIT assigned him to 35 schools in disadvantaged areas around Los Angeles, including the John H. Francis Polytechnic High School, which had a strong science emphasis. Hunt encouraged promising students to plan early and aim high when applying to colleges. He remembered one student he helped get into MIT's Minority Introduction to Technology, Engineering and Sciences program.

"The last time I heard from him, he was in graduate school at Johns Hopkins University working on his Ph.D. in biomedical genetics," Hunt said. "This guy has just left the earth as far as his abilities go."

Another Boeing employee, Erika Porter, a program manager in Boeing Commercial Airplanes' Technical Excellence organization, first became interested in educating students in the sciences

in the late 1990s while working as a writer/researcher on the "Bill Nye the Science Guy" TV program. She left the show to work at Boeing, where she spent 10 years assigned to various programs. Then she heard about a job opening for an education outreach coordinator.

Porter coordinates the After School Math and Science program, which sends Boeing engineers and technical professionals to teach special topics, such as the various aspects of flight, to elementary and middle school students.

"It really fits my passion for reaching out to young people," she said. "And while I'm not working directly with the students, I feel like I'm doing something that's going to have an impact beyond my time with the company." ■

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to succeed."**

*— Cindy Stong, Lean project  
manager, Mesa, Ariz.*

# Language bridge

Program helps Boeing employees communicate worldwide

By JoAnn Houlihan

Trister Huang, an office administrator in Xiamen, China, who supports the 747-400 Boeing Converted Freighter, was among Boeing employees in Asia who recently completed a pilot program to help them communicate more effectively—in English.

“The team I assist speaks English—it’s our working language,” Huang said. “The program helped me communicate better and express my ideas more precisely.”

Of all the business tools that Boeing employees need to be successful, command of a common language ranks near the top. The program Huang and others participated in was so successful that it now is open for enrollment across the enterprise, with courses beginning in April.

“We connect through language,” said Jillian Du, the Human Resources leader in China who spearheaded both the pilot and the enterprise launch of the Business English program for non-native English-speaking employees. “Speaking it well wherever you are located influences your ability to communicate by phone, by email and in meetings.” English is considered the language of aviation and, for instance, is even used by air traffic controllers when handling international carriers.

The pilot program was developed following an HR employee training survey to determine those development opportunities most important to employees in the region. Communicating effectively and in English was highly ranked by survey participants.

Beginning April 1, the program will be available for up to 500 employees for whom English is their second or third language. Interested employees are encouraged to make the course part of their development planning. Employees who participated in the pilot said they liked the self-paced online course, which can be accessed anywhere or anytime.

“We want to provide the skills people need to communicate successfully, wherever they sit,” said Rick Stephens, senior vice president of Human Resources and Administration. Boeing quickly realized the potential of the program to improve employee development, he said.

Du and the team behind the Global English launch—Andrea Lim, HR leader in Singapore, Smita Dash, HR leader in India, Akiko Kuroki, HR leader in Japan, and Micah Mayer, Learning, Training and Development International Sourcing—were recognized last fall with an HR Excellence award.

“This program,” Du said, “is a big win for all employees because it brings us closer together.” ■

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*Interested in participating in the Business English Program? Visit <https://blog.web.boeing.com/blogs/LearnEnglish> on the Boeing intranet for more information.*

**PHOTO:** Boeing China’s Trister Huang. ASSOCIATED PRESS

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## FLYING THE FLAG

A Boeing 777-300ER (Extended Range) operated by Emirates performs the final flyby to close the Dubai Airshow in November. It was flanked by a formation of jets from the United Arab Emirates' aerobatic team, which trailed smoke in the colors of the country's flag. Emirates is the world's largest operator of the 777 and ordered 50 extended-range models during the show—part of a record sales year for the 777 program in 2010. PHOTO: EMIRATES





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