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Frontiers

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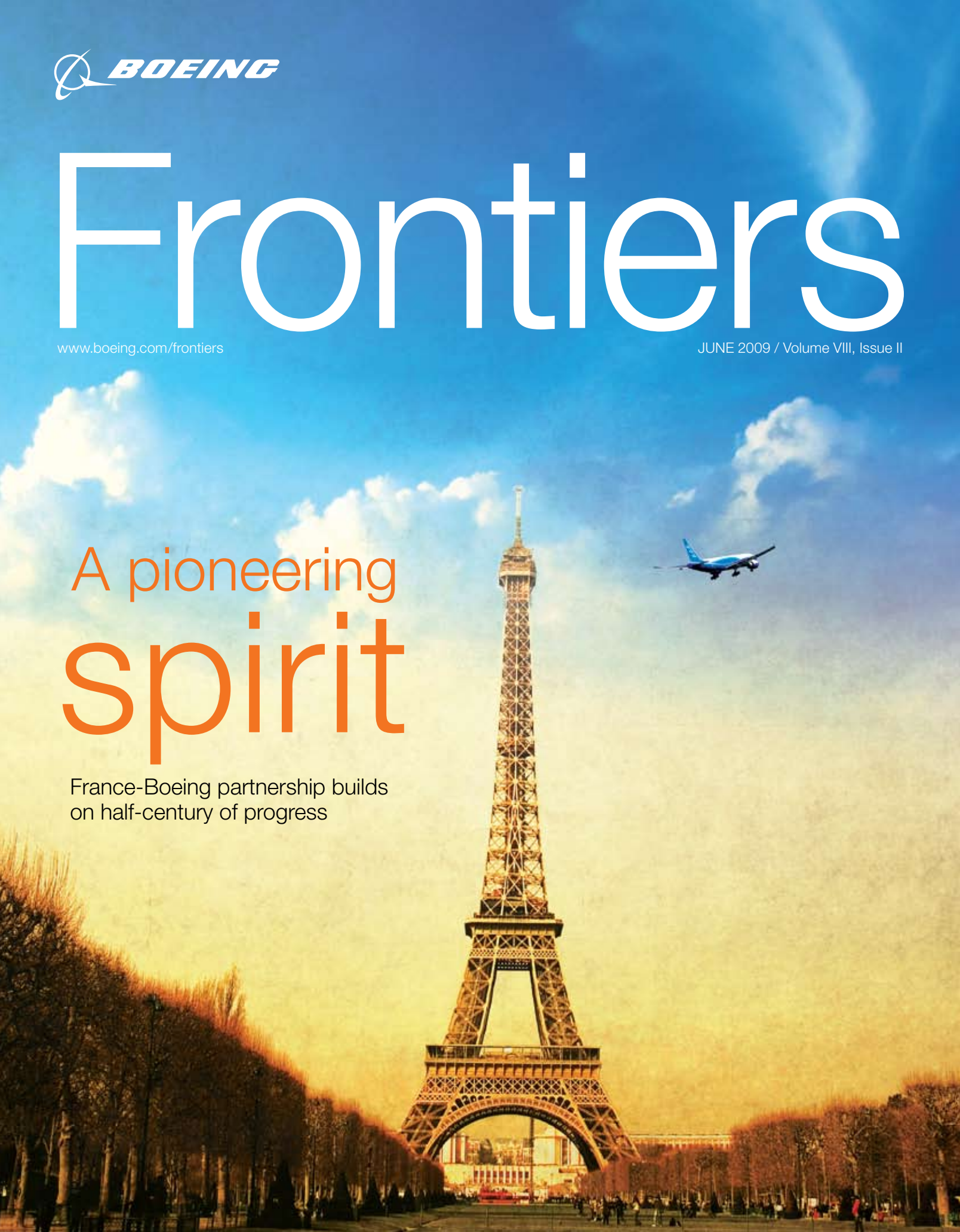
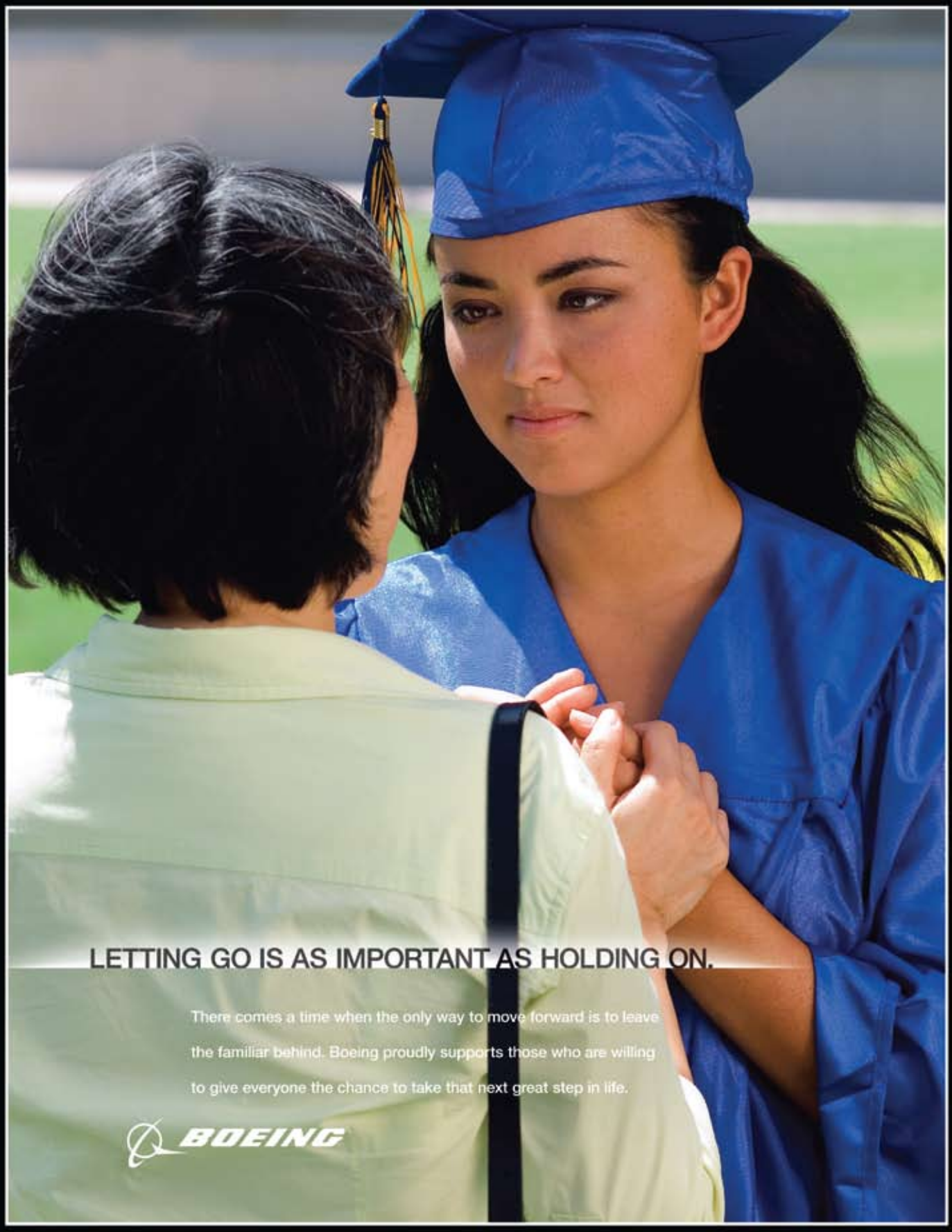


A pioneering spirit

France-Boeing partnership builds on half-century of progress



Global corporate citizenship refers to the work Boeing does—both as a company and through its employees—to improve the world. This ad illustrates Boeing's commitment to organizations that improve outcomes for the largest possible number of students.

On the Cover

COVER IMAGE: PHOTO ILLUSTRATION BY BRANDON LUONG/BOEING; PHOTOS BY GAIL HANUSA/BOEING AND SHUTTERSTOCK.COM

PHOTO: GAIL HANUSA/BOEING

Main Feature

Frontiers

Publisher: Tom Downey
Editorial director: Anne Toulouse

EDITORIAL TEAM

Editor:
Paul Proctor: 312-544-2938

Managing editor (acting):
Ann Beach: 312-544-2997

Deputy managing editor:
Vineta Plume: 312-544-2954

Art director:
Brandon Luong: 312-544-2118

Commercial Airplanes editor:
Julie O'Donnell: 206-766-1329

Engineering, Operations & Technology editor:
Junu Kim: 312-544-2939

Human Resources and Administration editor:
Geoff Potter: 312-544-2946

Integrated Defense Systems editor:
Diane Stratman: 562-797-1443

Shared Services editor:
Beriah Osorio: 425-577-4157

ONLINE PRODUCTION

Production manager:
Alma Dayawon: 312-544-2936

Web designer:
Michael Craddock: 312-544-2931

Graphic designer:
Brandon Luong: 312-544-2118

Web developers:
Lynn Hesby: 312-544-2934
Keith Ward: 312-544-2935

Information technology consultant:
Tina Skelley: 312-544-2323

HOW TO CONTACT US:

E-mail:
BoeingFrontiers@boeing.com

Mailing address:
Boeing Frontiers
MC: 5003-0983
100 N. Riverside Plaza
Chicago, IL 60606

Phone:
312-544-2954

Fax:
312-544-2078

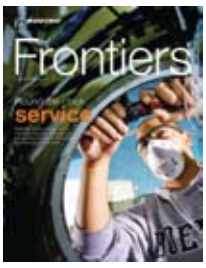
Web address:
www.boeing.com/frontiers
Send all retiree address changes to
Boeing Frontiers, MC 3T-12
P.O. Box 3707
Seattle, WA 98124-2207

Postmaster: Send address corrections to
Boeing Frontiers, MC 3T-12
P.O. Box 3707, Seattle, WA 98124-2207
(Present addressees, include label)

At press time, *Boeing Frontiers* learned of the loss of Air France Flight 447. We extend our heartfelt sympathy to the victims, to their families and friends, to the employees of Air France, and to all who are affected by this accident.

– Boeing Frontiers

INSIDE



CORRECTIONS

On Page 3 of the May 2009 issue of *Boeing Frontiers*, two Boeing photographers' credits were misplaced. The May cover image (left) was photographed by Lance Cheung. The image of the C-17 aircrew trainer was photographed by Bob Ferguson.

Sustaining the momentum toward sustainable growth

International cooperation and action will ensure long-term, environmentally responsible growth of the aviation industry

"It's not only the right thing to do for the future of our planet, but it's a smart business decision that will help ensure the health of our industry over the long term."

– Jim McNerney, Boeing chairman, president and chief executive officer

This month, as aviation leaders gather for the biennial Paris Air Show, our industry finds itself confronting substantial global economic challenges. Airlines, lessors and equipment manufacturers are all feeling the pressure and adjusting their business plans to weather the storm. So, too, are many governments as reduced economic activity has impacted tax revenues.

I believe it's vital even in these tough times that our industry and its governmental stakeholders continue advancing our commitment toward long-term sustainable growth. It's not only the right thing to do for the future of our planet, but it's a smart business decision that will help ensure the health of our industry over the long term.

Today, aviation contributes about 2 percent of global man-made carbon dioxide (the main greenhouse gas associated with climate-change concerns), according to the United Nations' Intergovernmental Panel on Climate Change. And IPCC estimates this number could grow to 3 percent by 2050.

We can and must prevent that from happening. Our industry took an important step in that direction in 2008, when customers, suppliers and competitors at an Air Transport Action Group meeting in Geneva, Switzerland, jointly committed to a pathway toward carbon-neutral growth and the aspiration of a carbon-free future.

The four areas where the aviation industry has near-term opportunities to make big environmental improvements are:

FUEL EFFICIENCY

Over the past 50 years, Boeing—through improving the fuel efficiency of its jetliners—has reduced carbon emissions by about 70 percent per passenger. We remain committed to making each generation of our commercial airplanes at least 15 percent more efficient than the airplanes they replace. Our competitors have also demonstrated a similar commitment.

An important next step is to advocate for a global fuel efficiency standard for new airplane designs—one defined by a widely respected group like the International Civil Aviation Organization. ICAO has a strong track record for successfully establishing global standards, having done so for both airplane noise and emissions of nitrogen oxide. Establishing a global

(Continued on Page 6)

PHOTO: Specially shaped nacelle trailing edges on the 787 Dreamliner reduce engine noise to communities by controlling the way air mixes after passing through and around the engine.
ED TURNER/BOEING

"Despite the current economic challenges, the cooperative efforts of government and industry—on a global basis—are needed to ensure long-term, environmentally responsible growth of the aviation industry and the resulting global economic opportunity it will create. I am confident we will rise to the challenge."

fuel-efficiency standard for new designs is a straightforward approach that is easier to implement and regulate than a standard for commercial airplane operators, or managing multiple, potentially dissimilar, regional solutions.

SYSTEM EFFICIENCY

We believe that air traffic management improvements provide the greatest short-term opportunities to improve the environmental and fuel-efficiency performance of the transportation system. This is a major challenge that transcends national borders and industrial competitors, which is why international cooperation is so important.

Boeing has worked together with Airbus, a number of airlines and several nations' air-traffic officials to accelerate system-efficiency solutions and ensure global interoperability. In particular, we have worked to implement a fuel-saving tactic called Tailored Arrivals, one component of which allows airplanes to make steady and continuous descents all the way into an airport instead of the stair-step approach typically used today. Trials have shown this tactic can save up to 2,400 gallons of fuel per flight for larger aircraft. Imagine that kind of savings spread across the entire fleet. And once we add in the environmental benefits that would accrue from quickly implementing the many other efficiency-enhancing ideas government and industry have developed, the savings become even more dramatic.

SUSTAINABLE FUELS

Developing sustainable biofuels will help the existing airplane fleet reduce carbon dioxide emissions and will move us closer to carbon-neutral growth. Boeing has joined with airlines and engine manufacturers to conduct ground tests and commercial aviation demonstration flights that use sustainable biofuels mixed with traditional kerosene-based fuel. Enhancing cooperation between government and industry would further accelerate the development and introduction of advanced-generation biofuels that do not compete with food stocks or for water resources but still reduce our industry's use of oil and our greenhouse gas emissions.

OPERATIONAL EFFICIENCY

It is not enough for us to meet our customers' expectations for environmentally progressive products; we must also work as an industry to improve the efficiency of our facilities and manufacturing processes. Boeing, for instance, has achieved ISO 14001 certification (an internationally recognized environmental standard) at every one of our major manufacturing facilities and is pursuing aggressive five-year goals for environmental improvement in our operations. As we improve our recycling rates, use less energy to produce our products and lower the amount of harmful chemicals and byproducts we create, both our industry and our planet will be the better for it.

CONCLUSION

Because of the tremendous benefits aerospace brings to the world, our industry has enjoyed steady growth—with just a few pauses—over the past half-century. Despite the current economic challenges, the cooperative efforts of government and industry—on a global basis—are needed to ensure long-term, environmentally responsible growth of the aviation industry and the resulting global economic opportunity it will create. I am confident we will rise to the challenge.

I'm proud of the people of Boeing for their lengthy record of improving the environmental performance of our products, services and operations. And I'm honored to be part of an industry that takes its responsibilities to our planet so seriously. Together, we will make the future brighter for all of us.

Boeing has created an annual Environment Report (see Page 10) to detail our efforts to protect the environment. The 2009 report is available at www.boeing.com/environment. ■

Snapshot

ON THE PATH TO FIRST FLIGHT

On May 21, Boeing completed first engine runs on the 787 Dreamliner. This marked the first all-electric start of a commercial jetliner engine on a twin-aisle airplane. The two Rolls-Royce Trent 1000 engines had previously been started in test facilities. ED TURNER/BOEING

Quotables

"As we've gotten more visibility into the 2010 budget, we see some real positives."

– Integrated Defense Systems President and CEO Jim Albaugh on opportunities for Boeing in the 2010 proposed U.S. defense budget sent to Congress, as reported by Bloomberg on May 19.

"Boeing, GE and other airplane and engine manufacturers are convinced that a fuel-efficiency standard for new airplanes is an effective way to drive the development of fuel-saving technologies."

– Scott Carson, president and CEO of Boeing Commercial Airplanes, in a commentary about how Boeing works to improve the environment, published in the May 23 Wall Street Journal.

IAM PROMOTIONS

No promotions listed for periods ending April 24 and May 1, 8, 15 and 22.

ETHICS QUESTIONS?

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

Flying to the **edge of space**

The North American X-15 first flew 50 years ago this month

By Erik Simonsen

Fifty years ago on June 8, 1959, a sleek black aircraft was released from a NASA NB-52B flying at 37,550 feet (11,445 meters), marking the first flight of the remarkable North American Aviation X-15 rocket plane. With NAA test pilot/engineer Scott Crossfield in the cockpit, the unpowered test flight initiated an exhilarating 10-year journey that achieved hypersonic speeds and explored the upper edge of the Earth's atmosphere.

Conceptualization of Project 1226 dates back to June 24, 1952, when the National Advisory Committee on Aeronautics (NACA), which became NASA in 1958, recommended research flights with capabilities far beyond the Bell X-2's top speed of Mach 3.1 (3.1 times the speed of sound). A joint NACA, U.S. Air Force and U.S. Navy meeting on July 9, 1954, firmed up requirements and established a goal of Mach 6.6 and an altitude of 250,000 feet (76,200 meters) for Project 1226, which was later designated X-15.

With the concurrent Mercury manned spaceflight program, the United States was on a fast track into space but lacked critical data needed to achieve that goal. The X-15 program would be called upon to assist by focusing on aerodynamic heating, re-entry conditions, acceleration and deceleration forces, and reactions of crew to weightlessness.

After a contractor competition, with Douglas Aircraft a very close second qualifier, NAA was notified in September 1955 that it would build three rocket-powered X-15 aircraft. On Oct. 15, 1958, in a high-profile ceremony attended by then–Vice President Richard Nixon, the first X-15 (or NA-240) was unveiled at NAA's Los Angeles Division in Inglewood, Calif.

With the specified Thiokol 57,850-pound- (257-kilonewton-) thrust XRL99 engine behind schedule, two temporary 8,000-pound- (36-kilonewton-) thrust Reaction Motors XLR11 engines were installed, and on Sept. 17, 1959, the first powered flight took place. Despite a small hydrogen peroxide fire in the engine section, Crossfield easily reached Mach 2.1 and an altitude of 52,341 feet (15,954 meters). Capable of burning 18,000 pounds (8,165 kilograms) of liquid oxygen and anhydrous ammonia in a mere 85 seconds, the single XLR99 engine was installed for flight No. 34, which on Nov. 15, 1960, took U.S. Air Force test pilot Robert White to Mach 4.4 and 77,450 feet (23,607 meters).

Spectacular is probably the best descriptor for the X-15 program: NASA pilot Joe Walker reached a record altitude of 354,200 feet (67 miles, or 108 kilometers) on Aug. 22, 1963—a mission that earned Walker the coveted astronaut wings. With the X-15A-2 covered with an ablative coating to protect the aircraft's skin from extreme heating, Air Force Capt. William "Pete" Knight strapped in on Oct. 3, 1967. In addition, two large external propellant tanks were attached to the lower fuselage to allow the engine to burn for a total of 140.7 seconds. The extended burn time paid off, as radar data confirmed that the X-15A-2 had accelerated to 6,629 feet (2,021 meters) per second, or Mach 6.7, and reached an altitude of 102,100 feet (31,120 meters). Knight had traveled twice as fast as a bullet fired from an M-16 automatic rifle, and the unofficial speed record stood until the Space Shuttle first re-entered the atmosphere at Mach 22 in April 1981.

In all, eight X-15 pilots received their astronaut's wings for exceeding an altitude of 50 miles (80 kilometers) above Earth. Later, two of the pilots became NASA astronauts—Neil Armstrong on the Gemini and Apollo programs, and Capt. Joe Engle,

PHOTO: (ABOVE) After launch from the NASA NB-52B, Air Force Capt. William "Pete" Knight initiates ignition for his record Mach 6.7 (6.7 times the speed of sound) flight on Oct. 3, 1967. The aircraft's special white coating was designed to slowly burn off, or ablate, as it protected the X-15A-2's skin from high heats generated during the flight. NASA

U.S. Air Force, who commanded the Space Shuttle *Columbia* on its second flight (STS-2) in November 1981, and *Discovery* in September 1985 (STS-51I). Capt. Engle, at age 32, was the youngest to qualify for astronaut wings. He flew 16 X-15 missions, for which three of the flights achieved astronaut status. Engle, who retired as a major general (U.S. Air National Guard) and is currently an aerospace consultant, recently commented on the X-15 program.

"The X-15 provided the Space Shuttle Design Team with invaluable information on hypersonic flight, in particular, how to re-enter the earth's atmosphere with a winged vehicle, and how to precisely land a low L/D [lift-to-drag] unpowered vehicle."

The success of the X-15 program would not have been possible without untiring dedication as well as personal sacrifice. There are many visionaries and heroes associated with this program. At the forefront was the NAA design team of Harrison Storms, Charlie Felz and Crossfield.

Crossfield, U.S. Air Force Maj. Robert White, NASA pilot Joseph Walker and U.S. Navy Cmdr. Forrest Peterson were presented the prestigious 1961 Collier Trophy at a White House ceremony by then-President John F. Kennedy for "invaluable technological contributions to the advancement of flight, and for great skill and courage as test pilots for the X-15."

With NASA pilot Bill Dana at the controls, the last X-15 flight (No. 199) took place on Oct. 24, 1968.

By far surpassing its design specifications, the X-15 represents a pinnacle of aeronautical achievement. Its contributions extended to all manned spaceflight programs including, Mercury, Gemini, Apollo and the Space Shuttle. Through the ensuing decades, Boeing's hypersonic/spaceflight vehicle activities have continued with the X-20 Dyna-Soar, the Space Shuttle, the X-30 National Aerospace Plane and the X-43 Hyper-X. Today, Phantom Works continues research in that exclusive flight regime in the form of the HyFly and X-51A WaveRider programs. ■

erik.simonsen@boeing.com

X-15 contributions to aerospace

- First application of hypersonic wind tunnel theory on a flight vehicle
- First reusable super alloy structure for the hypersonic flight regime
- First restartable, throttle-controlled and man-rated rocket engine
- Demonstrated pilot's ability to control a rocket-boosted vehicle in exoatmospheric flight
- Demonstrated pilot functions during weightlessness
- First spaceflight stellar navigation system
- Use of horizon all-spectrum scanner (an extreme altitude reference)
- First application of the MH-96 adaptive control system that automatically transitioned from conventional flight controls to the reaction control system for high-altitude flight, and back again for descent
- First demonstration of piloted, dead-stick (unpowered) landing techniques starting at high altitudes and more than 200 miles (322 kilometers) from the landing site
- Development of wedge-tail vertical stabilizer for hypersonic stability control
- Development of advanced pressure suits

X-15—tale of the tape

General characteristics

- Crew: One
- Length: 50 feet 9 inches (15.47 meters)
- Wingspan: 22 feet 4 inches (6.81 meters)
- Height: 13 feet 6 inches (4.11 meters)
- Empty weight: 14,600 pounds (6,622 kilograms)
- Loaded weight: 34,000 pounds (15,422 kilograms)
- Powerplant: 1× Thiokol XLR-99 liquid-fuel rocket engine developing 57,850 pounds (257.3 kilonewtons) of thrust

Performance

- Maximum speed: Mach 6.7
- Range: 280 miles (451 kilometers)
- Service ceiling: 67 miles (108 kilometers)
- Rate of climb: 60,000 feet per minute (18,288 meters per minute)
- Thrust-to-weight ratio: 2.07

NASA

On a greener path

Boeing's environmental progress highlighted in 2009 report

By Jennifer Cram

Last month Boeing issued its 2009 Environment Report, which details its strategy and actions to pioneer environmentally progressive technologies that improve environmental performance and reduce the company's environmental footprint.

"Protecting our planet's environment and finding new ways to harness diverse energy resources continues to be a priority for Boeing—and in 2008 we met a number of significant goals," said Jim McNerney, chairman, president and chief executive officer. "We continued to help lead our industry's efforts to safeguard the environment through action and collaboration."

Boeing is pursuing an aggressive, five-year environmental improvement plan at its operations. The company is targeting a 25 percent improvement by 2012 in energy efficiency, recycling rates and greenhouse gas emissions intensity at its major manufacturing facilities, with a similar goal for hazardous waste reduction. Boeing is on track to meet these goals—and in fact outperformed its 2008 plan in all four areas, according to Mary Armstrong, vice president of Environment, Health and Safety.

"Our targets are transparent and aggressive and they have our full attention, from top company leadership to every employee across the enterprise," Armstrong said.

Water usage is also being reduced and consumption has been lowered by more than 40 percent since 2002.

Building on the company's legacy of driving environmental performance improvements through technology advancements, Boeing's newest airplanes—the 787 Dreamliner and 747-8—will be 20 percent and 16 percent more fuel-efficient, respectively, than the airplanes they replace. And Boeing is committed to improve the fuel efficiency of each new generation of commercial airplane by at least 15 percent. In addition, the company is developing technologies to help government and military customers achieve their goals for energy efficiency and independence.

The report highlights Boeing's major environmental accomplishments over the past year, which include:

- Conducting test flights with Virgin Atlantic, Air New Zealand, Continental Airlines and Japan Airlines to demonstrate the technical, economic and environmental viability of sustainable biofuels for aviation.
- Helping demonstrate Air Traffic Management concepts that significantly reduce fuel consumption, emissions and noise.
- Receiving approval from the U.S. Environmental Protection Agency's Climate Leaders program for the company's five-year greenhouse gas emissions reduction target.
- Achieving ISO 14001 environmental certification for all major manufacturing facilities by the end of 2008.
- Developing and deploying a collaboration and engagement strategy with suppliers aimed at reducing environmental impact.

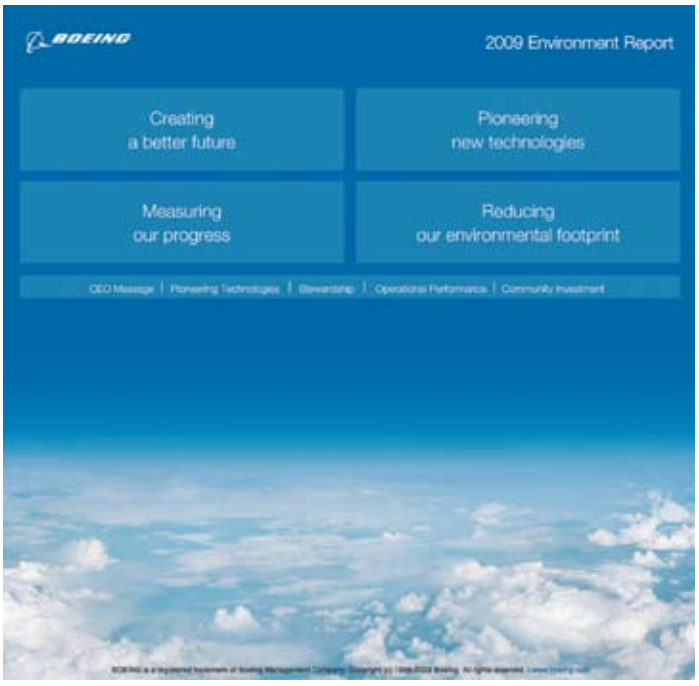


PHOTO: The 2009 Environment Report describes Boeing's efforts in developing progressive technologies that reduce environmental impacts as the company pursues an aggressive five-year environmental improvement plan. GRAPHIC BY MICHAEL CRADDOCK/BOEING

In addition to its environmental commitments for products and operations, Boeing's investment in the community remains strong. In 2008, the company contributed about $5.7 million to support innovative local environmental programs, from environmental education efforts in Korea, Italy and Washington state to conservation and restoration projects in India, the Amazon River area and California.

The report also showcases the work of employees, who are developing breakthrough technologies and have formed more than 20 employee-led "Green Teams" that seek ways to reduce environmental impact at worksites and in communities. Boeing's employees also collectively donate thousands of hours of their own time each year to company-sponsored environmental volunteer events.

"Today's employees are advancing the same spirit of innovation that has driven Boeing's leadership in aerospace for nearly 100 years," McNerney said. "That spirit will continue to help us meet our commitments to protect our environment and create a better future."

To view the report, visit www.boeing.com/environment. ■

jennifer.k.cram@boeing.com

PHOTO: Boeing driver Rodney Johnson shows off the company's first medium-duty diesel-electric truck, which supports initiatives by Boeing to reduce the environmental impact of its products and operations. SALLY ARISTI/BOEING

'Green' machine

Not all green trucks are painted green. In El Segundo, Calif., Boeing transportation is now using the company's first medium-duty diesel-electric truck. It's a 22-foot (6.7-meter) Freightliner with a lift gate—and it's painted white.

"It drives like a regular truck and has comparable torque and horsepower," said driver Rodney Johnson. "But it's more fuel-efficient and is quieter than a regular diesel." The hybrid is powered by a compact version of the widely used Cummins Turbo Diesel engine, supplemented with an electric drive system. Electricity from onboard batteries provides an extra power boost for the truck when starting from a dead stop or pulling a heavy load uphill, reducing diesel fuel consumption. The batteries recharge during normal truck operations.

"We are glad to do our part supporting Boeing's ongoing environmental conservation initiatives," said Jack Ruffino, senior manager of Boeing Transportation Services and Fleet Management. "We hope this will lead to increased use of hybrids in the future."

– Dave Garlick

2 million and counting

Randy Tinseth, who hosts Boeing's popular blog, Randy's Journal (http://boeingblogs.com/randy), recently celebrated two milestones: two years of blogging and 2 million reader visits. Tinseth is vice president of Marketing for Boeing Commercial Airplanes. In his blog, Tinseth shares his perspective on the commercial aviation market and airplane programs, as well as stories from his travels around the world, often with unique photos and videos. For example, Randy's Journal featured this view of the 787 the day it traveled to the flight line.

PHOTO: ED TURNER/BOEING

Master and commander

The first painted P-8A Poseidon aircraft rolled out of the paint hangar last month at Boeing's Renton, Wash., facility, displaying its new U.S. Navy livery. Designated T-2, the aircraft is the third of five test aircraft being assembled and tested as part of the System Development and Demonstration contract that the U.S. Department of Defense awarded Boeing in 2004. The first test aircraft, T-1, which successfully completed the program's first flight in April, will be painted in the same paint scheme later this summer. The Navy plans to purchase 108 P-8A anti-submarine warfare aircraft to replace its fleet of P-3Cs. Initial operational capability is planned for 2013. The P-8A is built by a Boeing-led industry team that includes CFM International, Northrop Grumman, Raytheon, Spirit AeroSystems and GE Aviation.

PHOTO: JIM ANDERSON/BOEING

Red, white and bleu

Inside

PHOTO: Symbolic of the close and growing partnership between Boeing and France, a 777 performs a sunrise flight framed by the Eiffel Tower in Paris.

PHOTO ILLUSTRATION: BRANDON LUONG/BOEING; AIRPLANE PHOTO: GAIL HANUSA/BOEING; EIFFEL TOWER PHOTO: SHUTTERSTOCK.COM.

Boeing and France build on historic aviation partnerships

By Maureen Jenkins

With an aerospace history that goes back more than half a century, Boeing and the country of France have shared ties across the commercial and military worlds. From Air France's first DC-3 purchase in 1939 to enduring industry partnerships that keep aircraft flying across the globe in the 21st century, Boeing and France have developed and maintained an alliance that has benefited both over the decades.

While Boeing has a small work force within France—employees here work largely in field service, sales and marketing, and fleet support—the Boeing France headquarters are housed in central Paris, giving business unit and Boeing International leaders access to influential counterparts in government and business. Boeing Commercial Airplanes has maintained a strong and steady presence for years—French airlines have ordered hundreds of Boeing airliners—and Integrated Defense Systems is looking forward to potential growth opportunities within this strategic European nation.

Doing business in France has been a winning proposition for Boeing, and leading the integrated, companywide charge within the country today is Yves Galland. A lawyer with a career that spanned more than 25 years in French government, politics and business, he has parlayed strong and deep personal relationships into growth for Boeing.

"The first step in developing the Boeing strategy for France was enabling the business units and corporate entities to work together, pool resources and share their expertise," said Galland, president of Boeing France. "The goal was to *shape the market and create a favorable environment to grow our business*. It took about a year before we started to see results and now, six years later, the progress is remarkable. Today, we are a cohesive unit located in the Boeing Paris office (including Boeing International, Shared Services Group and Communications) and within the framework of our country strategy we are successfully growing our business in France."

Shep Hill, president of Boeing International, said France fits into Boeing's global growth strategy "by seeking the best customers and working with great partners." And most of all, Hill said, Galland and Boeing International work behind the scenes to create a favorable business environment for all of Boeing.

"This is a place where the French example is a wonderful one," Hill said. "The role of Boeing International is to help create a competitively advantageous environment with stakeholders in government, media and the nongovernmental organizations, or NGOs, giving us a local image while hopefully being able to affect some decisions. The strategy was collaboratively developed and implemented as a shared responsibility between the business units and BI, and that shows the power of 'One Boeing.'"

Galland works closely with IDS International Business Development's Pierre Lenhardt and Commercial Airplanes Air France Sales Director Jean Thouin "to come up with an effective, One Boeing approach," Hill said. "There are no 'private property' signs, as I like to say."

STRONG SUPPLIERS MAKE THE DIFFERENCE

One of Galland's main goals was to integrate Boeing into the "local fabric" of France. "Leveraging the supplier, having them working together with us around Boeing goals and objectives, is absolutely key in my opinion for Boeing all over the world, when possible," he said. Galland has helped achieve this through the creation of the Boeing French Team, a core group of 14 supplier-partners based in France. These global aerospace companies' respected positions and influence within France makes it easier for Boeing to do business here. (See related map on Page 15 and article on Page 16.)

Said Hill: "In terms of French industry and French perspective and the Boeing French Team, we've really come a long way in being recognized as an industry partner to France."

PHOTO: Boeing France President Yves Galland outside the Paris office: "We must do what our competitors don't expect us to do."
RENAUD PEREZ/HOT DEF

Within France, Boeing has contracts with more than 100 company suppliers, allowing these firms to create and maintain thousands of local jobs. Two of these suppliers, Messier-Bugatti and Radiall, recently were named Boeing "Supplier of the Year" in the Electronics/Hydraulics/Mechanical and Common Aerospace Commodities categories, respectively.

"The French have been working at this for a century, and they're very good at it," said Joel Johnson, executive director–international for The Teal Group, an aerospace and defense industry consulting firm based in Fairfax, Va. "Americans forget that in World War I everything we flew was either a French or British airplane. If you're looking for countries with aerospace excellence, until recently you would have been able to count them on one hand, and the French are one of the fingers."

If you're a French supplier, Johnson said, you know "there are only a limited number of new aerospace programs in a decade and if you want to stay in business, you'd better get involved in as many of those as you can. Just as American companies want a part of [building] Airbus, French companies want a part of Boeing."

DOING BUSINESS IN AIRBUS' BACKYARD

During his tenure, Galland has employed what he calls the "Napoleon strategy." "It's something very simple: We must do what our competitors don't expect us to do. We must surprise them, which is the way to be successful in France. The creation of the Boeing French Team was totally unexpected."

Hill added that "while there might be a 'home field' benefit [for Airbus], if you demonstrate mutual value you can sell anywhere, regardless of where your competitor is home-based."

As they do each day, Boeing leaders in France continue building and strengthening relationships with current and potential Commercial Airplanes and even IDS customers. "There have been some changes in the country in two years," Galland said. "For industrial and political reasons, there are new opportunities which exist for IDS in France. We try to start from the very beginning and have a solid basis. Over the next two years, step by step, working together, I hope we can win a major competition for IDS."

To this end, IDS recently held a program management workshop at DGA, the French defense procurement and export agency, and is hosting an industrial seminar with member companies of the Boeing French Team at the Boeing France office.

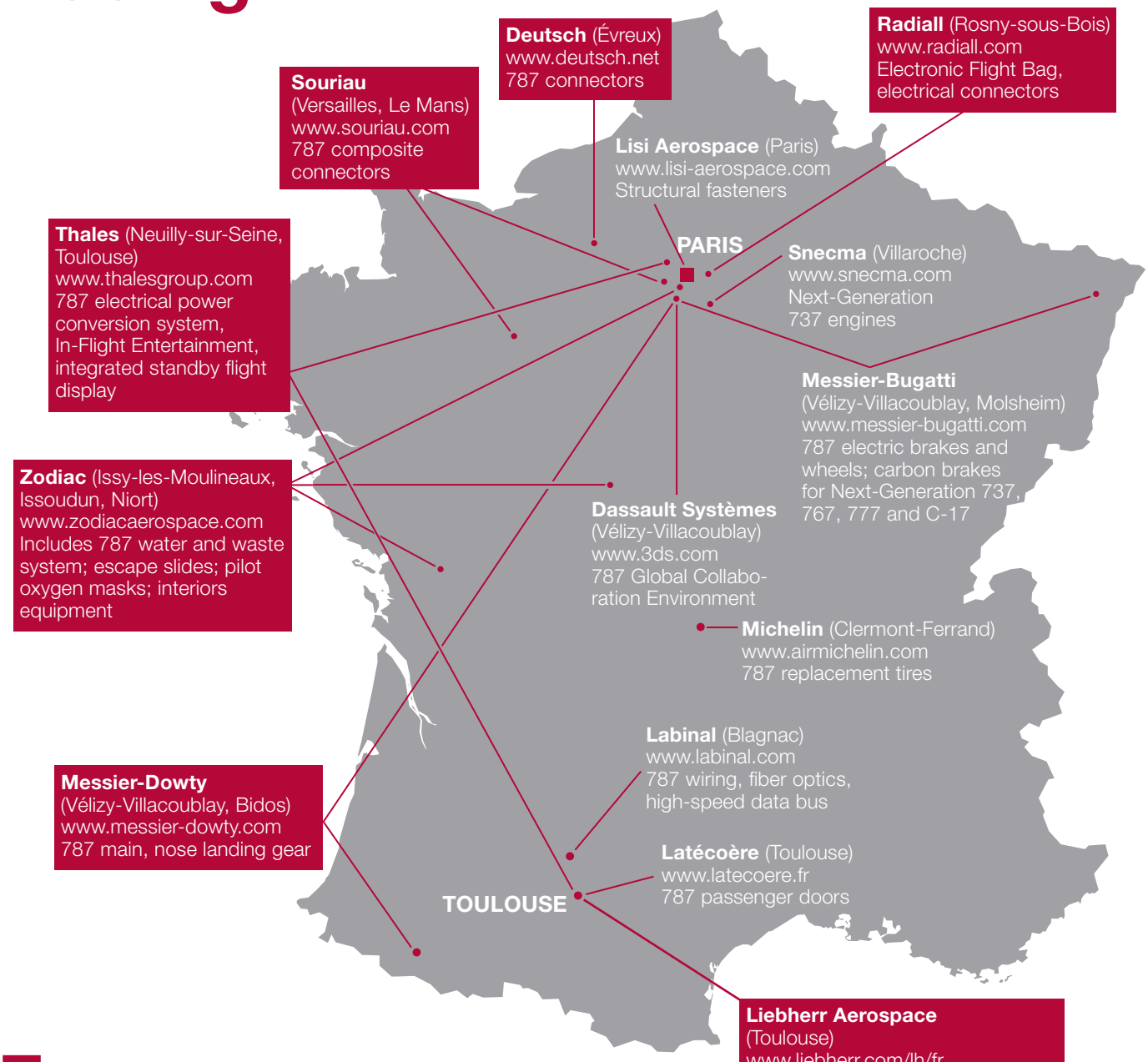
"In the defense world," said The Teal Group's Johnson, "it's very hard for an American company [to break into France], or for a French company to crack the American market. Part is political; part is bureaucratic. That's going to take time," he said. "As every department of defense needs to cut costs and increase efficiencies, that may drive us to buying the other guy's stuff rather than reinventing the wheels or guns. The Europeans and French, in particular, want to maintain some kind of military product independence. The issue is how much they want to pay for it."

When the Paris Air Show takes place at Le Bourget this month, Boeing will present a cohesive, cross-enterprise approach to doing business.

"Aerospace is a wonderful industry—the technology, the performance, the people are really special," Hill said. "The air shows allow us as an industry to show off in a reinforcing way. Boeing's presence this year will be reflective of the current marketplace, but it will also be at a level to ensure we get our message out." ■

maureen.l.jenkins@boeing.com

Boeing French Team



France at a glance

Location: Western Europe, bordering the Atlantic Ocean, the English Channel, Belgium, Luxembourg, Germany, Switzerland, Italy, Monaco, the Mediterranean Sea, Andorra and Spain

Area: 211,208 square miles (547,026 square kilometers); largest nation in Western Europe and slightly smaller than the U.S. state of Texas

Estimated population, 2009: 62.1 million people

Capital: Paris

Other major cities: Lille, Lyon, Marseille, Toulouse

Estimated gross domestic product, 2008: $2.6 trillion (U.S.); ranked fifth worldwide

Estimated GDP growth rate, 2008: 0.7 percent

Main export partners: Germany, Spain, Italy

Major airlines: Air France-KLM Group, Aigle Azur, Air Méditerranée, Axis Airways, Blue Line, Brit Air, Corsairfly, Corse Méditerranée, Eagle Aviation, Europe Airpost, OpenSkies, Régional and Transavia.com

Sources: Government of France, U.S. government, World Bank

All for one, **one for all**

The Boeing French Team builds business on both sides of the Atlantic

PHOTO: Several of Boeing's supplier-partners in France contribute to the 787 Dreamliner program—a relationship that benefits the French economy and Boeing alike. BOEING GRAPHICS

When taking office in 2003, Yves Galland knew he faced a special challenge as president of Boeing France, a company doing business on the "home turf" of one of its major competitors, Airbus.

So rather than fight, he decided to engage Boeing's key supplier-partners in an ongoing relationship, one that would leverage their involvement with Boeing to help the company do business in this European country. They included Boeing's long-standing French engine supplier, Snecma (now part of the SAFRAN Group), plus several other French companies that have been selected to be leading partners of the 787 Dreamliner program. This aerospace alliance has become a core element of Boeing's business strategy in France, which is to grow the company's presence within the country and increase the participation of French industry within Boeing.

Thus, in April 2006, the Boeing French Team was born.

"There was a supplier base in the past in France around Snecma and CFM," said Galland, referring to the engine manufacturing partnership between U.S.-based General Electric and Snecma, which makes CFM-56 engines for the 737. "We were, and we still are, the [largest] customer of Snecma. This was very important, but as important as it was, it was a limited footprint because there were a lot of suppliers besides Snecma. When we chose the world's most capable suppliers and partners on the 787, several of them were French.

"My duty and our interest was to leverage that new supplier base," Galland said. "That is why I decided to create what now is the Boeing French Team."

Not only did 1,100 people—including those whose companies belonged to the Boeing French Team—attend Boeing France's celebration of the 787 rollout in July 2007, but members of the team flew to Seattle in April 2007 to visit Commercial Airplanes facilities. "That was very useful," said Galland. "It gave us the credibility of a two-way street. We co-organized with them, as well, two symposiums, which were very successful—one on reinventing the pleasure of flight and one on the environment. That was an example about what we can do together with the Boeing French Team."

At the end of each year, partners who work across the Boeing enterprise are invited to the company's offices in Paris, allowing them a chance to network not just with Boeing but also with one another. "The Boeing French Team is now quite well-known within the country," Galland said. "And the CEOs are the best advocates for the 787." Today, the team has grown to include 14 companies.

Added Boeing International President Shep Hill: "The idea of the Boeing French Team has been replicated in a number of other countries—Turkey, Italy, India, Japan. It has served as a model, and the model beyond the actual companies is that a mutual benefit is a shared benefit. It's given us a local presence that creates the right environment for French airlines to acquire our aircraft by highlighting the large amount of work that Boeing places with world-class French suppliers."

Here, Jean-Paul Herteman, chief executive officer of the SAFRAN Group, and Olivier Zarrouati, chairman of both the Executive Committee and the Executive Board of Zodiac Aerospace Group, talk to *Boeing Frontiers* about how the Boeing French Team has benefited their corporations and the French aerospace industry.

Q. Boeing France President Yves Galland has worked over the past six years to convince French stakeholders—customers, suppliers, the public—that Boeing offers opportunities for mutual value creation. How has this benefited your company?

Herteman: Of course, SAFRAN and Boeing have been partners from a long time ago with the engine of the 737 "classic" airplanes in the early 1980s. Galland has been bringing us a partnership that has created value for both SAFRAN and Boeing. Our companies have provided landing gear, brake systems, global wiring for the 787. This has been very significant to new development for us. We had the opportunity to bring breakthrough technologies to the 787, the first [commercial] airplane anywhere to have electric system brakes. It's more value for us because it's an opportunity to put in the marketplace great technology, but it's also great value for Boeing and its customers because it's an airplane with more efficiencies.

Zarrouati: Yves Galland and his team did a great job over the past six years building the Boeing French Team. As a world leader for aircraft equipment, a longtime supplier to Boeing and a French-headquartered company, Zodiac Aerospace was a natural partner of this project. With 20,000 people worldwide, of which 10,000 are located in the United States and 5,000 in Europe, Zodiac Aerospace is convinced that the partnership of "best-in-class" companies is the only way for successful programs and mutual value creation.

Q. How has your participation within the Boeing French Team helped benefit France's economy and its aerospace/technology industries?

Herteman: It's more business, more workload for our manufacturing facilities and an opportunity to bring breakthrough technologies to the marketplace. I think Boeing gets good value for its money.

Zarrouati: The participation of French companies in the 787 Dreamliner program certainly helped benefit France's economy. But I must acknowledge that for a group like Zodiac Aerospace, with only a quarter of its work force in Europe, the nationality of the manufacturer does not matter. We have structured our company as a global network, for engineering and production units, to benefit from highly skilled engineers and workers worldwide, to propose to our customers the best products and systems at the best price.

Q. Why were so many French manufacturers selected to participate as key suppliers for the 787 Dreamliner program?

Herteman: The Boeing Company, I believe, has made a very wise analysis of the supply chain capabilities. A number of French companies have been able to be awarded the contracts. Air traffic for sure is global, and it's a little bit like the Olympic Games in China—it's one world and one dream. We work together to bring the best of our engineering and manufacturing capabilities. We are happy and proud that French industry can be part of that global stake.

Zarrouati: The 787 Dreamliner will be a technological breakthrough and a commercial success, as shown by the order book. It was therefore important for Boeing to select the best suppliers, whatever their nationality. With a longtime aerospace tradition and know-how, French manufacturers were obvious candidates for the Dreamliner program. On the other hand, equipment manufacturers have to select the best programs in which to invest. Participation of top suppliers, of which Zodiac Aerospace is one, is highlighting the attractiveness of the 787 Dreamliner's business model.

Q. How has the Boeing French Team shaped the perception of Boeing within France and its aerospace industry?

Herteman: I do believe the Boeing perception from the French aerospace industry was very, very positive, even before the creation of the Boeing French Team. For [industry] Tier 1 and Tier 2 players, our destiny is to work for Boeing as well as Airbus and in the next 20 years, with companies from emerging countries. We are suppliers and Boeing is as important for us as Airbus. Engine-wise, we do more with Boeing than with Airbus. It's a global industry.

Zarrouati: The action of the Boeing French Team has helped build a strong image of Boeing as a reliable partner for long-term programs and long-term partnership. Zodiac Aerospace was proud to bring its own experience and to contribute to this achievement.

– Maureen Jenkins

Jean-Paul Herteman, chief executive officer
SAFRAN GROUP

An international company that includes Snecma (whose joint General Electric venture provides engines for Next-Generation 737s), the 54,500-employee SAFRAN Group is based in Paris and contains three major companies that supply the 787. Messier-Dowty provides the main and nose landing gear. Messier-Bugatti has created the airplane's electric brake systems (787 purchasers can choose this system or one from Goodrich), making the 787 the first large commercial airplane with electronically actuated brakes. Labinal is supplying the airplane's wiring, including the use of fiber optics and a high-speed "data bus" supporting requirements for the airplane's avionics and systems.

PHOTO: PITCHAL

Olivier Zarrouati, chairman, Executive Committee, and Executive Board
ZODIAC AEROSPACE GROUP

Zodiac Aerospace and its companies, which have 77 production sites around the world, are significant suppliers to the 787 Dreamliner. They provide the airplane with its water and waste system (through its subsidiary Monogram Systems); escape slides (Air Cruisers); pilot oxygen masks (Intertechnique/Avox); primary electrical power distribution as well as cockpit illuminated panels, keyboards, landing gear lever, and windshield wipers (ECE); landing gear and flight control harnesses (Icore); and interior equipment (C&D Zodiac).

PHOTO: ZODIAC

A **pioneering** pair

Boeing and Air France: Making aviation history together for half a century

Air France's distinctive winged seahorse logo—the *hippocampe aile*—was circling the globe more than a half-century ago when the airline relied on Douglas DC-3s, DC-4s and other stalwarts of the propeller-driven age to cross continents and oceans.

If one airplane represents Air France's worldwide fleet today, it's the Boeing 777. So it's no accident the 777th Boeing 777 to roll out of the Everett, Wash., factory this spring bears Air France's new colors and logo, emphasizing its importance to that successful airplane line.

The 777, however, is not the first Boeing airplane for which Air France has been a crucial customer. It may be the dominant airline in a nation most associated with Boeing's largest commercial airplanes' competitor, Airbus, but Air France and Boeing have enjoyed a partnership that predates the jet age.

"Air France has operated many Boeing airplanes and shown itself to be pioneering, innovative and very successful," said Aldo Basile, Boeing Commercial Airplanes' vice president of Sales for Europe, Russia and Central Asia. "Following the merger with KLM nearly five years ago, the Air France-KLM Group is now the world's largest airline by revenue and a major current and future potential customer for Boeing Commercial Airplanes."

Pierre Vellay, Air France's senior vice president of New Aircraft and Corporate Fleet Planning, is proud of the role his airline has played in the development of the 777. "The 777 has been a valuable asset to the long-haul fleet of Air France, and it is the right aircraft to allow us to maximize our revenues in the most economic and efficient manner," he said at the 777th delivery ceremony in April.

"Air France has operated many Boeing airplanes and shown itself to be pioneering, innovative and very successful."

– Aldo Basile, Boeing Commercial Airplanes vice president of Sales for Europe, Russia and Central Asia

In fact, more than half of the twin-aisle airplanes in Air France's fleet are 777s, and the airline is among the top three customers for that line. Air France also has been instrumental in the creation of both the 777-300ER (Extended Range) and the 777 Freighter, said Larry Loftis, Everett site and 777 Program vice president. "This exemplifies the strong relationship that exists between our two companies."

Vellay said the 777's efficiency caught his airline's attention in 1994, a year before its first revenue flight for launch customer United Airlines, but it did not have the range Air France needed. To remedy that, the airline was influential in developing the 777-200ER, which extended the 777's range up to 7,800 nautical miles (8,976 miles, or 14,446 kilometers). As a result, Air France ordered its first 10 777-200ERs in November 1996. "That was the beginning of the story," Vellay said.

PHOTO: The Douglas DC-3 played a key role in the early Air France fleet. BOEING ARCHIVES

PHOTO: More than half of the twin-aisle airplanes in the fleet of Air France are Boeing 777s. GAIL HANUSA/BOEING

Air France not only ordered more 777s in the following years, but it also encouraged Boeing's other versions that fit the airline's needs, most recently the 777 Freighter, which Air France took delivery of earlier this year. Despite a turbulent economic atmosphere for airlines, Vellay added that Air France plans to continue ordering new airplanes to keep its fleet as modern as possible. Whether those future orders will include the 787 hasn't been determined yet, he said.

"We are not in a rush because we have a very recent, very fresh and young fleet," Vellay said. "But of course we know that within the four, five or six coming years, we have to do something. So definitely, the 787 will be part of the competition."

Air France-KLM has more than 70 percent of the domestic aviation market in France, but a half-dozen other airlines also fly Boeing airplanes, including Air Méditerranée, Axis Airways, Blue Line, Corsairfly, Europe Airpost and OpenSkies. Transavia.com, part of Air France-KLM Group, is growing a fleet of leased 737-800s.

PHOTO: Pierre Vellay, Air France's senior vice president of New Aircraft and Corporate Fleet Planning, sits in the flight deck of the 777th 777 built by Boeing. The 777-300ER was delivered to Air France in April. BOEING

> "[The 777] is the right aircraft to allow us to maximize our revenues in the most economic and efficient manner."
>
> *– Pierre Vellay, senior vice president of New Aircraft and Corporate Fleet Planning, Air France*

Basile said people in France feel very strongly about the magic of flight and respect Boeing's track record of innovation in aerospace. The company's many industrial links with world-class French suppliers help uphold Boeing's reputation, he said. For his part, Vellay credits Boeing with working closely with its customers.

"It's through these extraordinary relationships, and also because I consider that you are very good listeners, that we have succeeded on different programs, especially the 777, the -300ER and the Freighter," Vellay said. "And I'm still pushing for major improvements in the near term."

Basile said there is a solid foundation on which to keep the partnership between Air France and Boeing moving forward into the future.

"When you look back at the history of our two companies, it is clear that we have fostered a close relationship because we have achieved so much together," Basile said. "Furthermore, many Boeing employees are in frequent contact with Air France at all levels throughout the two companies, supporting the airline with its day-to-day operational requirements."

– Eric Fetters-Walp

The **French** connection

How one Boeing employee in France strengthens global partnerships

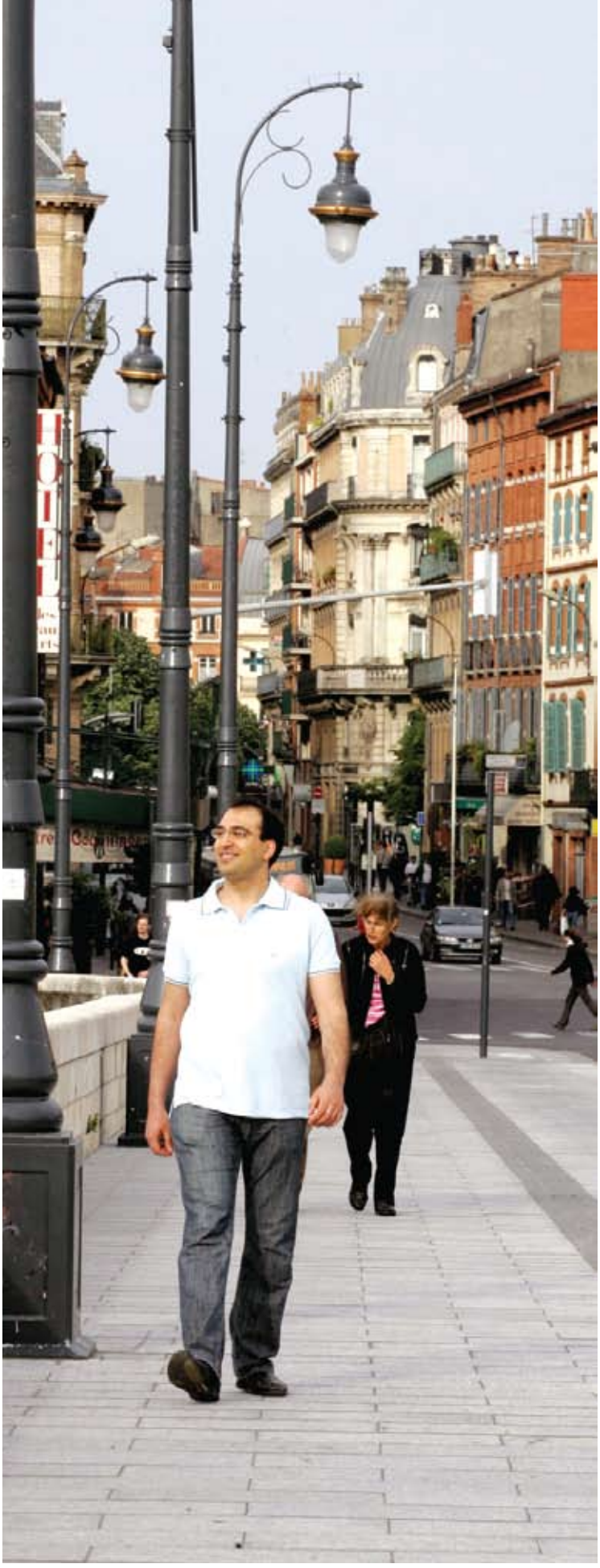
Even Boeing employees temporarily located in France support members of the Boeing French Team. One of these is Farzin Shadpour, a Boeing Commercial Airplanes program manager, industrial engineer and Lean specialist who since late January has been working in southwestern France with Latécoère, a key 787 supplier-partner in Toulouse that provides passenger doors. As a U.S. expatriate, he's also done short-term assignments with Boeing partners Israel Aerospace Industries in Israel and French supplier Messier-Dowty in Gloucester, England.

Boeing Frontiers talked to Shadpour about his work and life in historic Toulouse, a city of about 800,000 that's the fourth-largest in France—and home to competitor Airbus.

My general responsibilities: To get the 787 passenger doors to the airplane and create the right communication environment so that happens. My job is to do whatever I can to help Latécoère with its manufacturing processes. Sometimes it's looking around Boeing and finding the right person who can help me. Working at various partner sites over the past two years, I have this great network of friends within Boeing—some of whom I've never met in person. In addition, I have responsibility to support any other supplier management business in France and Europe, as time allows.

What my supplier-partner Latécoère contributes to the 787 Program: Latécoère designs and manufactures all passenger doors for the 787. It has a large 787-related engineering team of about 40. The company also makes doors for Airbus, Bombardier and Embraer airplanes and Dassault's Falcon 7X business jet. It's the oldest aerospace company in France. Its history is very close to Boeing's.

My day-to-day duties with my Latécoère teammates: There is no typical day. I check e-mail on my BlackBerry before I go to bed. The e-mails come from Everett, Wash., so I know what is hot and what is not and I am prepared for the upcoming day. Most of the time I end up getting into the Latécoère office, which is next to the factory, after 9 a.m., maybe 10, and I stay until 6 p.m., 7, 8, 9. The good thing about French culture and French companies is they don't have too many unnecessary meetings.



> "I've learned that if I want to be successful, I have to become part of their team. There has to be that trust and rapport so we can work together."
>
> *– Farzin Shadpour, Commercial Airplanes program manager*

How I, as a Boeing employee, add value to my on-site supplier-partner: I know the challenges Latécoère is facing because these happened at the previous Boeing partners where I have been. As an outsider, I bring a fresh set of eyes. Specifically, as a Boeing employee, I bring the network I have with me.

What I would add to my work experience: I would like to help do a Global Corporate Citizenship project here in Toulouse; this is one of my personal goals. This is one side of the American corporate identity that unfortunately is less known in Toulouse. By doing a GCC project, I want to demonstrate this aspect of U.S. corporate culture and, specifically, Boeing's contribution to the French people, Toulouse citizens and people in the aerospace community.

Differences between working with Boeing supplier-partners in France and other countries: The biggest one is the communication culture and the speed at which you can learn that and gain their trust—and once you gain that trust, how quickly you can work with them. I've learned that if I want to be successful, I have to become part of their team. There has to be that trust and rapport so we can work together. I've known people who could speak a foreign language fluently and not get anywhere when they went on assignment.

Most culturally different thing about living and working in France: It's the work-life balance. It's working at work time and not doing anything else like chatting. When the French are working, they're *truly* working and have the highest productivity. When they're done with work, they're home and with family.

Most interesting thing about working in Toulouse, the home of Airbus: Seeing the Beluga [Airbus A300-600ST Super Transporter] fly over. It's quite a scene. Also, the shock local people have as soon as you tell them you work for Boeing!

– Maureen Jenkins

PHOTOS: (FAR LEFT) Boeing Commercial Airplanes' Farzin Shadpour, shown here on the Latécoère factory floor, says the most challenging part of his Toulouse assignment is the continuous learning. **(LEFT)** Shadpour strolls through the historic city of Toulouse. FRED SCHEIBER/ASSOCIATED PRESS

Something in the air

IDS teams up with France to provide best value to customers

The French call it *je ne sais quoi*: that special quality that words can't fully express. It also describes the reinvigorated mood for international partnerships in today's political, military and economic environment. Since taking office in 2007, French President Nicolas Sarkozy has worked to improve relations between France and the United States. During the country's presidency of the European Union (a six-month term that ended in December 2008), France engaged its EU partners with an aggressive agenda to demonstrate Europe's ability to manage global challenges such as terrorism and piracy. And this past March, France was reintegrated in the North Atlantic Treaty Organization, rejoining NATO's Integrated Military Structure after an absence of more than 40 years.

France, with the largest defense budget in Europe and the third-largest in the world, has always been a market of interest for Boeing Integrated Defense Systems. But now, more than ever, the decades-long relationship between Boeing and France presents new potential to work together.

For IDS, that means delivering on opportunities—including innovative programs and products—to enhance systems interoperability between French and Allied Forces to more effectively meet global challenges. These opportunities include requests from the French defense procurement agency, or DGA, on major programs where industry partnerships can exist between France and the United States. And, according to Joe McAndrew, IDS regional vice president for Europe, Israel and the Americas, "The more local a face you can put on these programs, the more successful you'll be."

Here's a look at some of the ways Boeing is working locally with France to provide the best value to IDS customers.

Mid Life Upgrade to AWACS: Since the early 1990s, with the delivery of the E-3 Airborne Warning and Control System (AWACS) to France, Boeing has been supporting the French Air Force to meet France's airborne warning and control requirements. In 2006, Boeing was awarded a risk reduction contract to define requirements for the largest AWACS upgrade to date, which has Boeing collaborating with French industry to define the parameters of the Mid Life Upgrade program. Boeing anticipates a contract award for the program later this fall.

Deck Landing Feasibility Study: Committed to working with local French industry, Boeing has won a contract with French company Thales Aerospace on an unmanned aerial system (UAS) Deck Landing Feasibility Study. Boeing will use its Unmanned Little Bird demonstrator, a modified MD 530F helicopter, as a platform to help the DGA define the best UAS for France's army and navy needs.

Heavy-lift program: Boeing is in discussions with French industry to collaborate on future transport helicopter requirements in Europe.

ScanEagle UAS: Boeing is in discussions with the French Armed Forces and stands ready to provide ScanEagle UAS services to meet requirements coming out of Afghanistan for intelligence, surveillance and reconnaissance.

SCORPION program: Its abbreviation is menacing, but the System of Contact for Versatile Capabilities and Information Networking program—a family of vehicles similar to Boeing's Future Combat Systems but with integrated UAS services as a stinger—would be transformational for the French army. Boeing has secured a study contract to help develop SCORPION's collaborative environment and will continue to work with French industry to evaluate the potential of the program for France.

– Vineta Plume

PHOTO: Since the 1990s, Boeing has supported the French Air Force to meet France's airborne warning and control requirements.

BOEING ARCHIVES

Nourishing families and communities

Drawing on Boeing's brand as an innovator, Boeing France seeks innovative ways to partner with nongovernmental organizations to create solutions to community challenges. Since 2005, Boeing France has supported *Les Restos du Coeur*, an anti-hunger organization created almost 25 years ago.

Boeing initially provided funding to the nonprofit's highly visible *Camions du Coeur*, volunteer-staffed vans that deliver food to the needy during the cold winter months. The next year, Boeing funded the organization's *Les Jardins du Coeur* project, which offers the unemployed the chance to gain skills and experience working in the nonprofit's vegetable gardens, which yield produce used in the meals provided to the poor.

Since then the relationship between *Les Restos* and Boeing has continued to flourish. With Boeing's support, *Les Restos* has expanded its outreach to include other activities. In addition to adult and infant food aid, the group sponsors regional infant support centers (*Restos Bébés du Coeur*), which provide food and other necessities to infants up to 18 months old. In 2007, Boeing funded 13 infant support centers, where parents can meet and exchange information and seek advice from professionals.

"Our relationship with Boeing has grown through a deep understanding of each other's missions and the company's quality-focused contributions," said Bénédicte Brouard, the nonprofit's director of partnerships and grants.

Last year, Boeing supported another new initiative, *Les Toits du Coeur*, an outreach program providing emergency housing to homeless people in the country. The program includes social and professional rehabilitation and other support services, including securing permanent housing.

"We not only proudly support community programs such as *Les Restos*, we also nurture the growth of good ideas such as theirs. We recognize they give vulnerable families chances at a new beginning and at the same time build the health and well-being of the communities where they live," said Anne Roosevelt, Boeing vice president, Global Corporate Citizenship.

Boeing contributes to community projects in France as part of its GCC program, which focuses on five strategic investment areas to improve lives and communities worldwide: health and human services; arts and culture; education; civic awareness; and the environment.

PHOTO: Since 2005, Boeing France has supported *Les Restos du Coeur*, an anti-hunger organization. GILLES ROLLE/REA

100 years of the Paris Air Show

The Paris Air Show was first held in 1909, the same year that the Wright brothers toured France and excited crowds with demonstrations of the Wright Flyer.

The earliest recorded Boeing presence at the show was in 1957. The highlight of the Boeing exhibit was not a static display or a fly-by but a 1/20th-scale cutaway model of Boeing's highly anticipated commercial jet transport—the 707.

Jumping ahead to 1969, in response to a request from the United States government, a 747 winged its way from Seattle to Paris. Making a dramatic entrance, the 747 became a star of the show, drawing thousands of people who waited hours to get a glimpse of the world's first "jumbo jet."

Since that time, other great planes have represented Boeing's pedigree at the prestigious show, including the DC-10 airliner in 1971; the F-15 fighter; the E-3 Airborne Warning and Control System, or AWACS; YC-14 and YC-15 medium-lift military transport demonstrators in 1977; as well as the 777 airliner and Bell Boeing V-22 tilt rotor in 1995.

PHOTO: Among the many innovative airplanes that have represented Boeing at the Paris Air Show is the McDonnell Douglas YC-15, shown here at the 1977 event. BOEING ARCHIVES

There really is a ‘you’ in safety

How three teams excelled in workplace safety by making it a responsibility shared by all

By Junu Kim

One Boeing organization aims to improve workplace safety by building a culture of caring. Another seeks to learn lessons not only from incidents but also from near misses. And yet another has taken the initiative to make custom machine guards—which prompted requests from other sites for their own customized guards.

Teams across Boeing have undertaken a variety of tactics—some conventional, some offbeat—to improve workplace safety. Yet an important common denominator among Boeing groups with outstanding workplace safety performance is the sense that every teammate is individually and collectively responsible for creating a safe workplace. Indeed, one of the foundations of Safety Now, a new companywide effort to improve workplace safety, is the concept that everybody at Boeing is responsible for their own safety and the safety of their co-workers (see sidebar on Page 25).

“Everyone shares the responsibility to make sure we’re creating a safe, productive work environment—and everyone must contribute to help make their workplaces even safer,” said Mary Armstrong, vice president of the companywide Environment, Health and Safety organization. “Our families, friends, teammates and customers are counting on us to do our jobs safely.”

With June being National Safety Month in the United States, here are several accounts of how employee ownership of safety at work has helped Boeing teams.

PROPULSION SYSTEMS: A NEW APPROACH

When you hear about a Boeing team improving its performance, you might think about teammates adjusting processes. No doubt, that’s a tried-and-true method. Yet to improve workplace safety,

PHOTOS: (LEFT) Margaret Carter (right), a Propulsion Systems quality records clerk, documents serial numbers while Jeff Fix, Propulsion Systems mechanic, installs engine buildup hardware in Renton, Wash. JIM COLEY/BOEING **(RIGHT)** Dennis Sallutal (left) and Steve Parker, Propulsion System mechanics in Everett, Wash., follow safe workplace practices while building up a 777 engine. GAIL HANUSA/BOEING

the Propulsion Systems organization of Commercial Airplanes looked to emphasize changes not necessarily in its workflows but more so in its collective mindset.

In 2001, Propulsion Systems had a lost workday case rate of 3.1. That number was around the average for Boeing at the time but was "unacceptable" in the mind of Quentin Sisco, the organization's director of Manufacturing and Quality and now its acting vice president. (The lost workday case rate measures the number of lost workday cases—an occupational injury or illness resulting in one or more days away from work—in a year per 100 employees.)

To address this situation, "we didn't approach this by telling people they have to follow regulations," Sisco said. Instead, under the guidance of Sisco and Annette Champoux, who at the time was the safety administrator for Propulsion Systems, the organization aimed to "create an environment where people really will take care of each other," Sisco said. In that setting, it naturally follows that teammates are more conscious of workplace safety—which, of course, improves safety performance.

A culture survey determined that Propulsion Systems teammates expected excellence in everything the team undertook. That led to Champoux coining the phrase "Safety Excellence Everyday"—whose acronym of SEE also refers to the three basic tasks teammates need to undertake every day to promote safety:

- **S**urvey the area.
- **E**mployees: Are they safe?
- **E**quipment: Is it in good working order?

To put this phrase into service and build the environment of concern for employees, Propulsion Systems provided ways that teammates could start conversations after spotting a colleague doing something that was potentially unsafe. "It supported the idea that everyone was looking after each other," Sisco said.

Another tactic the organization undertook to create this environment was to give employees two large elastic bands for stretching exercises. To help reduce the chance of certain muscular injuries, Propulsion Systems worked with Boeing Recreation to develop a daily 10-minute stretching program using these bands. Employees were not required to perform the exercises, but those reporting they had done so for 30 straight days would get a free coffee. (The reason teammates get two bands: One could be kept at work, and the other could be taken home.)

These are a few of the many efforts to increase safety awareness that have changed the culture to where employees readily admit a personal responsibility for safety. "They are inspired and encouraged to make the necessary changes to improve safety," Sisco said.

The team's safety statistics show how this mindset has taken hold. The organization's lost workday case rate fell to 0.4 in 2007 and 0.19 in 2008. What's more, it's working on a streak of more than 500 days and 1 million hours without a lost workday case.

Just as important, that culture of safety is still strong. Sisco recounted a recent story of an employee walking under a scaffold in the Everett, Wash., factory and bumping his head on a low-hanging pipe. Propulsion Systems teammates immediately put padding on this pipe and placed streamers to bring attention to this low point. "They did it on their own," Sisco said. "It took them only five minutes to get on this."

ST. LOUIS SITE SERVICES: A LEADER MAKES IT PERSONAL

Shared Services Group's Site Services team in St. Louis includes people whose work involves a degree of risk, such as electricians, carpenters and firefighters. However, Steve Gill, the team's director, sought to change the view of this risk from an aspect of the job to something that need not be accepted.

"We're working to get to zero injuries," he said. "When it comes to injuries, I don't think there is an acceptable number."

To get the organization on board, Gill in mid-2007 formed an SSG team featuring his self-directed work team (High Performance Work Organization) leaders and safety representatives, and all members of his management team. Their simple mission: Prevent injuries.

The team was asked to help determine what could be done to prevent incidents and identify the root causes of SSG injuries. To address this, the team sought feedback from Site Services employees. Interestingly, the team found that despite its work emphasizing the importance of two-way open and honest communication, large gatherings of Site Services colleagues tended to provide little feedback.

Team members realized that not everyone is comfortable speaking before a crowd. In response, attendees at larger meetings were split into smaller circles. "When we broke into these smaller groups, we got fantastic input and feedback and discussions of what things to fix and how to fix them," said Bryan Kury, Service Center leader for St. Louis Site Services.

As part of the changes brought on by this safety push, the team spends more effort uncovering the lessons learned after an incident. On a similar note: Site Services also spends time looking at near misses to identify lessons learned. "You don't

Safety Now, for everyone

Boeing in March launched a companywide workplace safety effort that reinforces the importance of keeping everyone safe and sets an aggressive performance target.

The effort, Safety Now, aims to cut Boeing's lost workday case rate by 25 percent over the next five years. The lost workday case rate measures the number of lost workday cases—an occupational injury or illness resulting in one or more days away from work—in a year for every 100 employees.

Safety Now addresses both the individual actions of employees and the ways Boeing asks employees to work. It involves organizations from across the company, including Environment, Health and Safety, Commercial Airplanes, Integrated Defense Systems, Shared Services Group, and Engineering, Operations & Technology engineering and manufacturing teams. It sets up a process to improve design for ergonomics and safety and make targeted investments in high-risk manufacturing areas. And it provides people with tools and resources, all in the interest of reducing workplace injuries.

For more information on Safety Now, visit http://safetynow.web.boeing.com on the Boeing intranet.

– Junu Kim

want to have a near miss, but they give you the chance to make sure this doesn't happen again," Gill said.

Yet process changes represent only a part of the plan. Perhaps more important was Gill's stance on the topic and what he said to convey his beliefs. Kury recalled a team discussion after a Site Services employee sustained an injury. "Our talk related to the impact of this injury to the person, the person's family and the St. Louis team. Steve said, 'Safety is about you and your families' and really helped drive home the personal commitment needed to prevent injuries," Kury recalled.

The data validate the effect of these changes. Last year the number of recordable injuries, or an injury requiring medical treatment, fell to 49 from 66 in 2007, for the organization of about 650 employees. Thanks to that performance, along with improvements in lost workday cases and days lost due to lost workday cases, the Site Services team in 2008 registered a 37 percent improvement in an EHS recognition formula that tracks and consolidates these three statistical categories. That safety performance made the team one of the three most-improved programs in St. Louis last year. "Our safety performance is not yet where we want it to be, but the culture is being strongly established to continue to improve," Gill said.

Kury noted that this improvement couldn't have happened without Gill's commitment to workplace safety. "The leadership commitment by Steve is very evident in his words and actions," Kury said.

C-17 QUICK RESPONSE CENTER: HOW CAN YOU MAKE IT BETTER?

Have you seen new protective barriers or ergonomic lift units at the C-17 Quick Response Center in Southern California? They've come about thanks in large part to this team taking a proactive approach to safety.

The C-17 Quick Response Center, also known as C13, was established in April 2002 to provide emergent support to the C-17 Globemaster program by supplying critical parts for production, retrofits and urgent requirements in the field. It provides integrated, efficient fabrication operations including capabilities from precision machining to sheet metal work to materials processing, all in one facility.

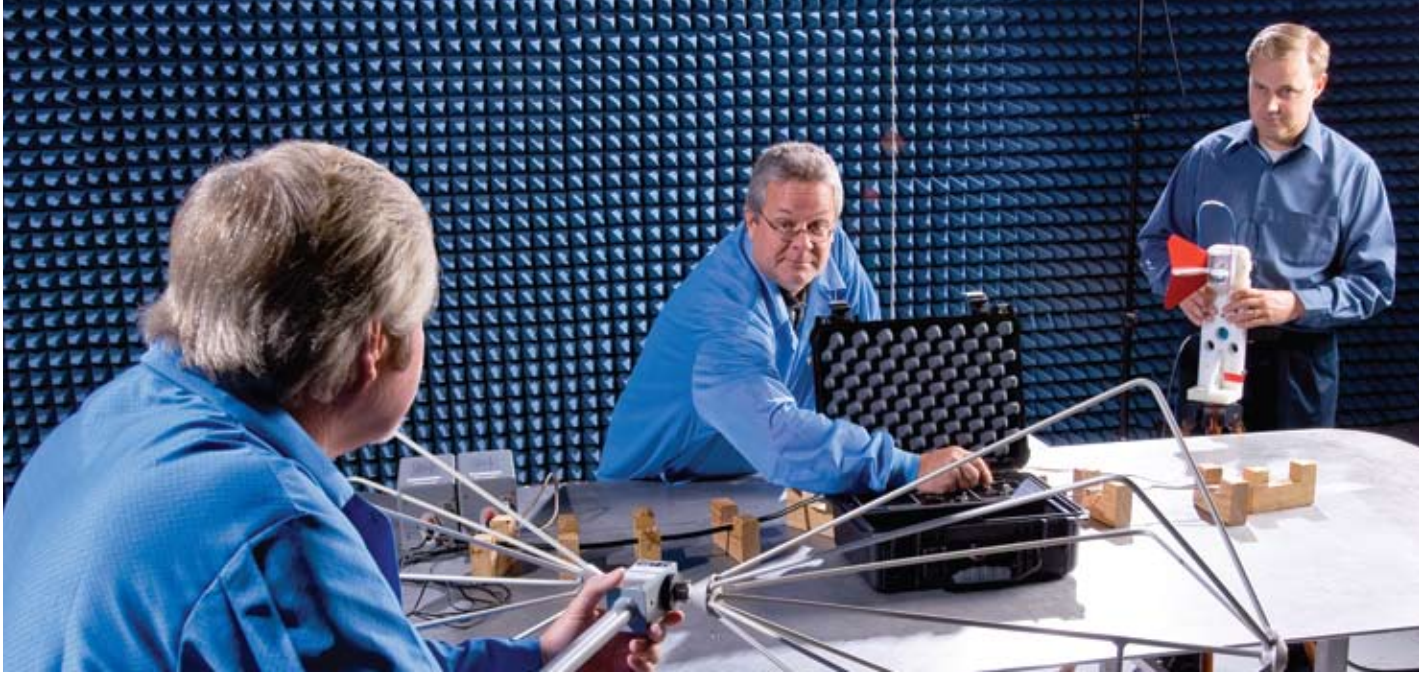
Although each work cell focuses on workplace safety in its own operations, the goal of the C13 site is a "One Team / Safety First" approach, said Ray Murillo, C13 site director. Accordingly, teammates are encouraged to discover potential workplace safety concerns and rapidly fix them through a proactive, team-based business approach. Safety concerns are addressed with the team's manager and are coordinated with the site's Maintenance and Environment, Health and Safety representative. That's led to new safety equipment such as ergonomically safe vacuum lifts for heavy material as well as customized machine guards. In fact, other Boeing sites have tapped the C13 team to design and supply customized guards.

"We don't wait for an accident to find us," Murillo said. "We seek out potential issues before a safety occurrence and resolve them." This safety initiative is reflected in the group's safety metrics. The team hasn't had a lost workday case in more than 18 months and has been six months without a recordable injury.

That take-charge attitude also led to a recent process change that had impacts on safety, the environment and costs—and earned an award. The C13's Quality Integrity Team collaborated with the C-17 program's Material Process Engineering Group to adopt a more environmentally progressive chemical processing method. Collectively, they developed and executed a plan to provide an alternative for a process that uses chromic acid, a chemical used to improve aluminum corrosion resistance in the aircraft, and instead use one based on boric sulfuric acid, which also boosts corrosion resistance but reduces environmental impact. In addition, the switch of chemicals, which also has happened at Commercial Airplanes, has improved quality and reduced cycle time and operating costs. As a result, the team last month received the Global Mobility Systems Safety Silver Eagle Award. ■

junu.kim@boeing.com

PHOTOS: (LEFT) Don Thorn, a mechanic with the Site Services team in St. Louis, works on an air compressor. RON BOOKOUT/BOEING **(RIGHT)** Dan Shelton of the C-17's Quick Response Center team uses a vacuum lift to move an aluminum plate. The machine enables a safer, quicker process for moving the heavy plates. MICHAEL GAIL/BOEING



Safety in numbers

Every Monday morning at Boeing Ogden's Little Mountain Test Facility in northern Utah, workers meet to talk about the coming week. The agenda might include centrifuge testing of a 1,000-pound (450-kilogram) test article, stage separation testing of a rocket or electromagnetic effects testing using lightning strikes.

"We recognize the inherent safety risks of our business," said Russ Hohmann, manager of the facility's Shock and Vibration labs. "Equipment and tests involve hazards and we don't take them for granted. We have a policy that all employees have the authority to stop a test if there is a safety concern."

"I don't worry about getting injured because we follow well-established processes and procedures to keep us all safe," added test engineer Vernon Hardy. "We respect the potential dangers of the tests we perform and, consequently, we work in a very safe place."

'SAFETY FIRST' FOCUS

With risks that include ordnance, laser and radiation sources, forklift and crane activities, and high-voltage work, how did Ogden become a Boeing model for safety? Indeed, the site's 270 employees boast more than 4 million hours—or more than seven years—without a day lost due to a job-related lost-time injury or illness.

"The employees accomplished it," said Rick Schankel, Boeing Intercontinental Ballistic Missile (ICBM) program director and Ogden site executive. "They were supported by a committed Environment, Health and Safety team and by management, but it was accomplished by each and every employee."

Boeing employees at and around Ogden perform sustaining engineering and a variety of upgrades for the ICBM program and

"Equipment and tests involve hazards and we don't take them for granted. We have a policy that all employees have the authority to stop a test if there is a safety concern."

– Russ Hohmann, manager, Shock and Vibration labs

engineering support for the Ground-based Midcourse Defense (GMD) program. Located at multiple facilities in the area, employees for both programs also work in the field at various locations.

While many of the site's most hazardous operations take place at the Little Mountain Test Facility, employees throughout Boeing Ogden do their part to maintain a safe workplace. Technical publications editor Valerie Woodruff wields a pen instead of a laser, but she and her work group think "safety first" all the same.

"Working in an office environment we accomplish safety training and apply all learned ergonomic principles," she said. "We're also responsible for incorporating safety requirements into our documents to support workers in the field."

Vien Voraotsady, a test and evaluation lab technician for GMD, climbs into missile silos to upgrade launch support equipment as part of his job. "As long as you have the safety mindset, you will

PHOTO: In the lab environment at Ogden Little Mountain Test Facility in Utah, Bill Lang (from left), Terry Blackburn and Vernon Hardy perform test article setup for an electromagnetic compatibility test in an anechoic (echo-free) chamber. WILLIAM MILNER

Adding up the numbers

- 4.3 million work hours, 2,724 days or more than seven years without a lost-time injury or work-related illness
- 50 consecutive months on or ahead of plan on the Integrated Defense Systems Environment, Health and Safety performance scorecard
- 50-plus consecutive government agency and customer inspections without a violation
- 100 percent EHS training compliance (averaging nine classes per employee)
- 2008 Boeing Employee Survey: 96 percent of employees say, "I feel safe from accidents and health hazards in my work area," a 5 percent increase in four years

PHOTOS: (TOP) Dale Sterrett and Joe Oberuc provide environment, health and personnel safety guidance for operations. **(ABOVE)** Lab technicians Bill Lang and Randy Rose work on the Ogden, Utah, site's electromagnetic effects capacitor bank.

WILLIAM MILNER

incorporate safety into everything you do," he said. "Before I start a job, I think it through and make sure there is no safety hazard involved. If there is, I try to alert everyone and find a way to eliminate it."

CREATING A MINDSET

Site leadership believes that "flawless execution of the business means flawless execution of environment, health and safety practices," according to Schankel. To get there, he said, the site took several steps, including establishing full-time Ogden Environmental, Health and Safety staff: Joe Oberuc and Dale Sterrett. Among the team's responsibilities: Design facilities and processes, develop programs, and conduct operations to protect the environment, employee health and safety—and ensure compliance with applicable laws, regulations, company requirements and contractual requirements. Ogden also ramped up its employee safety training and established an executive council that meets monthly to oversee safety at the site and review performance measurements.

Also, about three years ago, the Engineering organization at Ogden established an early program involvement procedure that designs EHS practices into new programs. "Planning safety into a program is much more effective than trying to incorporate it later on," said Kelly Johnson, Ogden's Ground and Systems program manager. "Through this process, EHS personnel, management, customers and suppliers become involved early in the proposal phase, developing plans that ensure the protection of personnel, compliance to regulatory requirements and fostering of good environment, health and safety behavior with Boeing internal and external partners."

While acknowledging Ogden's current safety record may someday end, Oberuc said, "We know the accomplishments can never be taken away. It is the sum of our environment, health and safety performance measures that are most important. With the safety steps Ogden has taken we are keeping Boeing employees safe one day at a time, and supporting a healthy business."

– Vicki Hogue

Investment in learning pays dividends for employee—*and Boeing*

By Kathleen Spicer

Breaking down a complex and potentially overwhelming project into bite-size, short-term pieces can help make it an easier task.

That's the advice given by Mike Kato, senior manager in Shared Services Group Frequency Management Services in Seattle, who recently earned a master's in project management through Boeing's Learning Together program. Kato currently manages Boeing's radio-frequency (RF) spectrum requirements and compliance in the United States that support company programs and operations, as well as the electromagnetics team that certifies and protects radio-frequency "shielded" rooms used for testing RF-radiating equipment, including avionics testing.

"I decided that I needed more 'tools in my toolbox,'" said Kato, who started taking courses toward the degree on weekends in October 2006. "I'd always wanted to go back to school and the timing was right. Boeing made it easy—there's no out-of-pocket expense. Not taking advantage of this program is like leaving money on the table."

Kato joined Boeing in 1998 as a first-line manager in SSG's Abatement Services organization. He'd been project managing informally—most recently for the implementation of a new radio system—but when he looked into Boeing's Future Skills Web site (http://ssg.boeing.com/future_skills on the Boeing intranet) it inspired him to reach further.

"I noticed that project management is one of the critical skills that Boeing will need in the future and I wanted to gain this credential to help direct my career path more thoughtfully," Kato said.

What Kato learned in the program has also benefited the SSG Site Services organization.

Before developing his thesis proposal, Kato chatted with Site Services Vice President Larry Edwards to obtain guidance on where to most beneficially invest his time. Kato soon was on a team that reviewed a facilities project with an underdeveloped budget and requirements. Kato began to apply his research to the project and helped put in place the Project Development Rating Index (PDRI) tool.

The PDRI is an industry tool used by many large companies at the onset of a project to clearly determine requirements in terms of scope, environment, cost and schedule. Its premise: The more tightly defined a project is upfront, the more successful it will be.

"After the first project, we conducted additional pilots using PDRI for a paint hanger project in Renton and for a waste treatment plant project in Auburn, Wash. We then surveyed the results to see if the tool was valuable," Kato said.

In synch with his research, the tool indicated substantial process and schedule developments and improved cost savings.

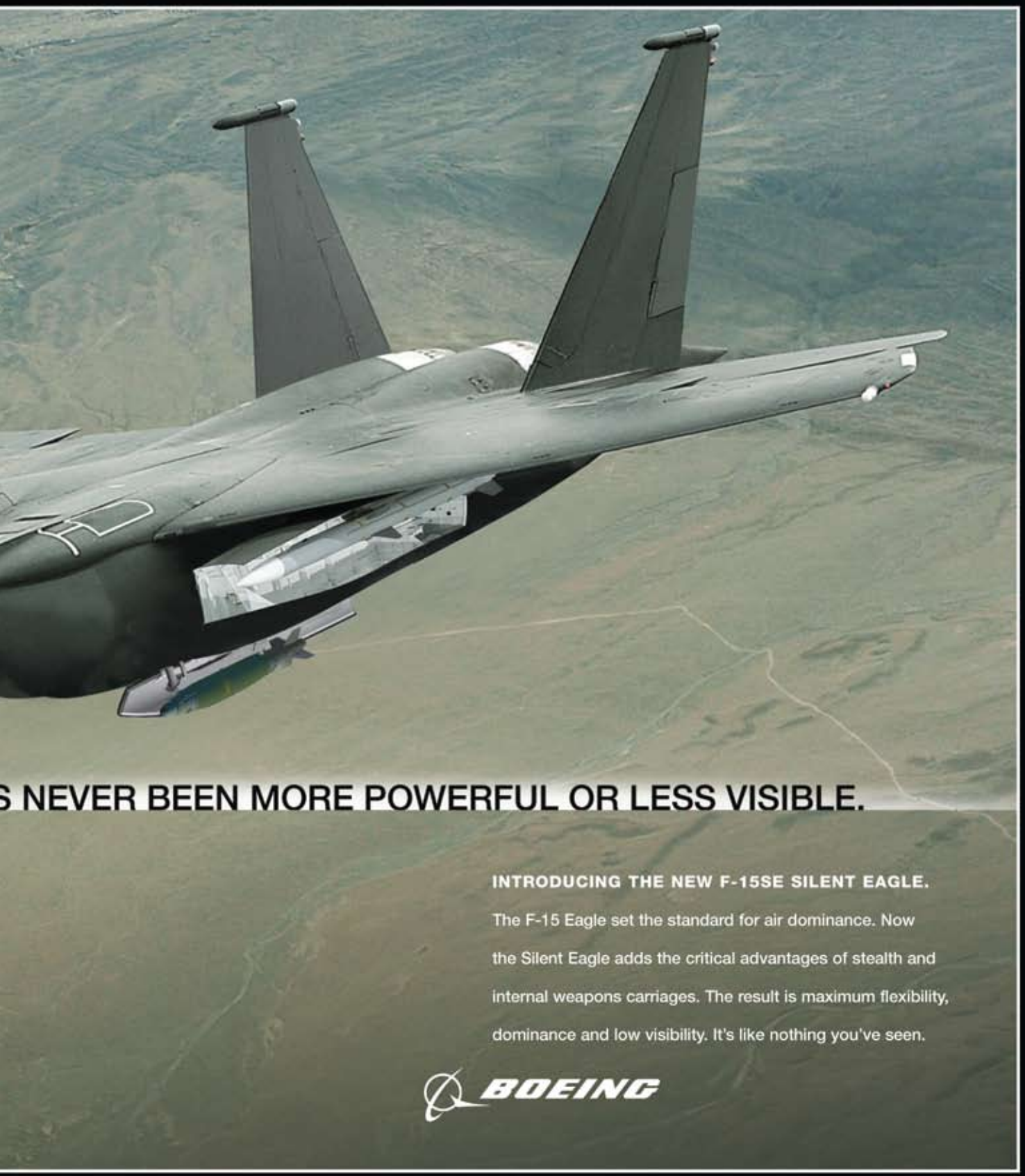
"Using PDRI for major Facilities projects has resulted in fewer change orders, better time management, increased cost savings and improved customer satisfaction," said Chuck Lynch, SSG Enterprise Project Office. "Thanks to Mike, the PDRI is now a best practice on our major construction projects." ■

kathleen.m.spicer@boeing.com

PHOTO: Mike Kato in Frequency Management Services applied a project-managing tool he researched and learned about while taking courses through the Learning Together program.

MARIAN LOCKHART/BOEING

This new Integrated Defense Systems print ad for the F-15 Silent Eagle is designed to sustain momentum for the new F-15SE and the added capability it provides from the combination of superior F-15 performance and new stealth features. The ad will run in various international trade publications.



S NEVER BEEN MORE POWERFUL OR LESS VISIBLE.

INTRODUCING THE NEW F-15SE SILENT EAGLE.

The F-15 Eagle set the standard for air dominance. Now the Silent Eagle adds the critical advantages of stealth and internal weapons carriages. The result is maximum flexibility, dominance and low visibility. It's like nothing you've seen.

BOEING

Ethics

A matter of everyone's leadership

By Rebecca Crichton

"We are all leaders in ethics. It is a responsibility on the part of employees to work through their leaders to resolve issues that cause uncertainty and stress in their lives," said Scott Carson, president, Boeing Commercial Airplanes.

Solving problems together with their teams is part of what Boeing leaders do daily. In fact, Boeing expects managers to be the primary resource for helping employees sort through all types of work-related challenges, including the ethical questions that inevitably arise in the course of business.

Providing tools and training to help managers in this role is a priority for Boeing's Office of Internal Governance (OIG). The organization's Ethics Web site contains extensive resources designed to encourage regular dialogue between managers and employees about ethics-related matters and to improve managers' skills in holding candid conversations on a range of issues.

As part of these efforts, OIG recently launched "Leadership Matters," an initiative that emphasizes cooperative problem-solving between managers and employees and promotes personal leadership in creating an ethical and compliant work environment. With an emphasis on collaboration, the initiative encourages all employees to take responsibility for sustaining an open culture and nurturing trust and integrity across the organization.

Ethics experts agree that when leaders listen well and take actions to address ethical issues, employees feel more comfortable coming forward with potential concerns. Coupling these actions with leaders both modeling ethical behavior and ensuring accountability can positively move employees' perceptions of an organization's ethical climate, according to studies by the Defense Industry Initiative, an organization that promotes ethical business conduct among companies doing business with the U.S. government. "Organizations where leaders talk about ethics, model ethical behavior, keep commitments and hold individuals accountable experience an improvement in the overall work environment," said OIG Senior Vice President Wanda Denson-Low.

Throughout Boeing, there are numerous examples of leaders setting the right tone and working alongside their teams in ways that reinforce the value of an open culture and a trusting relationship between employees and their managers—two elements that are at the heart of Leadership Matters.

PHOTO: Dennis Muilenburg, president, Integrated Defense Systems Global Services & Support, conducts weekly performance reviews where Leadership Matters plays a central role: "Leaders who consistently demonstrate the leadership attributes, in every situation, improve business performance, enhance customer satisfaction, drive growth and productivity, and increase employee engagement in every dimension." RON BOOKOUT/BOEING

PARTNERING FOR SOLUTIONS

Mike Bair, Commercial Airplanes vice president, Business Strategy & Marketing, recounts a time when "An employee approached me about a gift his manager had received from a supplier that was more valuable than what our rules would allow

him to keep. The employee had noticed the gift in his manager's office on several occasions, and didn't know how to ask his manager about the appropriateness of his keeping it. The employee wasn't sure of his manager's intent and didn't want to cause an unwarranted problem."

Bair worked it out directly. "The next time I visited the manager, I commented about the nice gift. He responded by saying, 'Yes, I can't keep it, I forgot to turn it in,' which he promptly did. I circled back to the employee and expressed my appreciation for bringing the matter to me first."

Where best to first take a potential ethics issue is a common question for individuals. "Boeing employees should feel confident that they can always contact Ethics when big questions challenge them," Denson-Low said. "But before they reach for the phone, they ought to consider asking their leaders whose guidance is closer at hand to help with the dilemmas they face."

OPEN COMMUNICATION

Building and maintaining a "foundation of trust" with employees is a vital step for every leader, said Marlin Dailey, vice president for Sales with Commercial Airplanes. "Our teams look to us and our behavior. We need to always act in ways that are consistent with our values and our words. And it's important they see that we take action when they come forward with concerns or suggestions."

Jim Wigfall, vice president, Supplier Management, Shared Services Group, agrees and makes a concerted effort to drive candor deep within his organization. "I encourage my team to establish an open environment with the teams they lead, and I do the same. I'm always willing to listen and want to create an organization that has a communicative environment. I accept any and all types of feedback."

Wigfall also works to maintain that trust with his team by acting on information or concerns passed on by members of his team. When told by an employee from another organization about unethical behavior in that employee's management chain, Wigfall looked into it right away. "There was a problem and we got to the root of it, held the necessary conversations and took the right actions to solve it."

Tips from Fab

Leland Adams, customer service manager, Boeing Fabrication Emergent Operations North, works out problems between suppliers, engineers and the factory daily.

Adams thinks that "Behaviors can be influenced by the environment either in a positive or negative way. Ethical leadership is the ability to foster a culture where people feel that it is expected of them to do the right thing." His direct reports benefit from his tips for keeping communication open:

Communication – Have direct conversations about ethical issues.

Be a role model – It is important that as a leader you set the example of expected conduct.

Accountability – Set expectations and hold people accountable for actions. Reward ethical behavior and help people avoid compromising their values.

Inclusion – When people have the benefit of diverse perspectives, they feel confident that they're making good decisions.

Adams also counsels:

- The right decision is usually not the easy one.
- Just because it is legal does not make it right.
- If it doesn't feel right, it probably isn't.
- Ethics is your integrity; once it is compromised, it's difficult to regain it.

THE POWER OF INCLUSION

Engaging employees in problem solving and issue resolution—on all types of matters—strengthens the company's culture and improves business results, too, said Shelley Lavender, vice president, Engineering, Boeing Military Aircraft, Integrated Defense Systems. "The culture we want to establish for positive, predictable performance and solid execution is the same culture and environment that will support ethical decision-making in the workplace," she said.

Lavender recalls approaching an employee with a complex, challenging business decision the organization was facing. "It had suppliers, customers and our company funds involved. I had to make a decision. I asked, 'If you were a program manager, what would you do?' Being asked for his opinion changed him. He was different as a result of being included. I was expecting the critical thinking part and how to approach it, but I got a whole lot more. I got a dedicated employee who has stayed connected and shared ideas."

For Chris Chadwick, president, Boeing Military Aircraft, IDS, the same principles of leadership that apply to growth and execution also apply to ethics. "We need to drive ethics and view

PHOTO: Lou Mancini, vice president and general manager, Commercial Aviation Services at Boeing Commercial Airplanes: "We have to take care of our customers. The strengths of Boeing are our honesty and integrity—that's our power." JIM COLEY/BOEING

it as a competitive advantage. My goal is to encourage my team to sustain our open culture so they feel comfortable coming forward about anything. It's not just about coming forward when there's a problem but speaking up when employees have good ideas, too."

SHADES OF GRAY

Sometimes making the right ethical decision is clear-cut and obvious. There are policies that need to be followed and rules and regulations that require compliance. But there are often many more situations that are not so easy to decide. It is the ambiguous issues where manager and employee engagement can be particularly effective.

"My experience has been that it's the shades of gray that are often behind ethical questions," said Nancy Cannon, vice president, Enterprise Services, Shared Services Group. "Few issues are truly black and white, so taking the time to understand context and, when possible, intent, can go a long way to providing clarity around whether something is an ethical issue or, more simply, a missed communication. In short, our employees are often looking for discernment versus judgment," she said.

Having honest conversations about emotionally charged or ethical concerns can be difficult for both managers and employees. But creating an environment where that trust exists is part of what it means to live the Boeing values.

Said Lavender, "As managers, we think we need to make all the decisions. We need to engage our teams more. That will help the culture we want become a reality. It starts with one person and then another. It's contagious. We need a culture that is open to sharing our thoughts and ideas, but it's all of us who create the culture we want." ■

rebecca.j.crichton@boeing.com

Transparency pays dividends

"There are simple things that help employees feel more valued. Part of that is re-establishing a close relationship with leaders."

– Ginger Barnes, vice president and deputy program manager, Future Combat Systems

Integrated Defense Systems Combat Systems (CS) deals with large and complex issues, usually dictated by defense budget cycles. Virginia "Ginger" Barnes, vice president and deputy program manager, Future Combat Systems, moved quickly in early April to address employees' concerns after a U.S. Department of Defense announcement to re-evaluate the production of various military programs, including the FCS Manned Ground Vehicles. After the IDS Leadership Team reported its initial impressions of the budget proposal in an all-employee e-mail, the FCS leadership followed up within 24 hours, hosting a virtual teleconference attended by 2,000 employees. "We went through the facts as we knew them. We told them what we didn't know, we told them about the discussions we had with customers. And we went around the call to all the sites to answer questions," Barnes said. Employees expressed appreciation for being told what happened in such a timely manner.

Barnes sees the situation as part of a broader work environment issue. Long hours, morale and retention issues all affect motivation. "How do you keep people motivated to keep performing? We keep hearing they want to have those candid discussions with their first-line managers."

To help their first-line managers be better advocates and supporters for their people, FCS conducted two Leaders Teaching Leaders training sessions. "We talked about diversity, work-life balance and customer satisfaction. The whole point is to teach the managers how to deal with those concerns and how important it is to address these things head-on with employees."

The divisionwide approach focuses on employee engagement and empowers people to share what they want to hear from their leaders. "Employee teams have told us how they want to be recognized, how they want to celebrate accomplishments, what they want to do and that knowledge has affected key things in how we operate. There are simple things that help employees feel more valued. Part of that is re-establishing a close relationship with leaders."

– Rebecca Crichton

Cleared for flight

Boeing engineers help resolve problem that stalled March shuttle mission

By Ed Memi

Astronauts who flew the Hubble Space Telescope repair mission last month boarded a safer Space Shuttle *Atlantis*, thanks in part to some Boeing "detectives." They helped NASA resolve control valve concerns that arose during the Space Shuttle *Endeavour*'s STS-126 mission last November.

As engineers worked to resolve problems with the gaseous hydrogen flow control valves that pressurize the space shuttle's hydrogen fuel tank, the subsequent STS-119 mission was delayed several times.

The 5-inch valves, located in the aft of the space shuttle orbiter, are part of its main propulsion system. There are three valves, each dedicated to one of the shuttle's three main engines. The valves' function is to regulate the flow of gaseous hydrogen from the main engines to the external fuel tank so the tank can then deliver liquid hydrogen to the engines at the correct pressure.

During the November mission, gaseous hydrogen flowed from one of the shuttle's engines at a higher-than-normal rate. To compensate, the other two gaseous hydrogen flow control valves automatically reduced the amount of their flow to prevent any problems during the ascent.

After the orbiter landed, Boeing engineers discovered the culprit. On the suspect line, a poppet—similar to a pop-up on a sprinkler head that regulates water flow—was cracked, and a small piece was missing.

"Our folks noticed there was a pressure differential on this flow control valve during the STS-126 launch," said John Frazer, Boeing subsystem manager for the space shuttle main propulsion system. Engineers and shuttle managers were concerned because the flow control valves serve a critical function in pressurizing the fuel tank during ascent. Boeing engineers in Houston, Kennedy Space Center, Fla., and Huntington Beach, Calif., worked closely with a larger NASA and industry team to determine what went wrong.

"We learned the poppet broke due to high cycle fatigue, meaning a tremendous number of cycles are incurred over a very short time. We suspected there might have been a hidden crack not caught by the inspection procedures in use at the time," said Mohammed Jebril, a Boeing space shuttle main propulsion system engineer.

"To mitigate the issue, we now make sure—through multiple inspection techniques—that we're using poppets that have no hidden cracks," Jebril said.

The analysis provided by Boeing was right on the mark. When engineers looked at the three replacement flow control valves that flew on the subsequent STS-119 mission in March, they saw no evidence of cracking, resolving any lingering concerns about the valves for the Hubble mission.

"It was challenging work to solve this complex issue," Frazer said. "It was a great team effort across NASA, United Space Alliance [the space shuttle operations contractor and a joint venture between Boeing and Lockheed Martin], Boeing and our suppliers.

"There is still plenty of follow-on work to ensure we use only the best flow control valves and that problems are mitigated," Frazer said. "But it's a great feeling to deal with an issue this complex, one that we hadn't previously faced, and come up with a solution that allows us to continue to fly safely." ■

edmund.g.memi@boeing.com

PHOTO: Boeing engineers played a leading role in troubleshooting the failure of a gaseous hydrogen flow control valve on a recent space shuttle flight. The valve regulates the flow of gaseous hydrogen from the main engines to the external fuel tank so the tank can deliver liquid hydrogen to the engines at the correct pressure. RYAN SMITH/BOEING

High-tech paradise

Boeing provides critical supercomputing, space surveillance and customer support in Hawaii

By Lynn Farrow
Photos by Bob Ferguson

Boeing Hawaii Site Executive Jerry Cornell admits there's a typical response when he tells people Boeing has facilities on both Maui and Oahu in Hawaii—surprise and envy. "Their next question is, 'How do I get a job there?'" he said.

But it's not the turquoise waters, white sands or tropical breezes that draw most Integrated Defense Systems employees to Hawaii—although that helps. It's the work: the challenges and satisfaction of successfully identifying and tracking man-made objects orbiting high overhead; conducting top-level research; or performing sophisticated modeling and simulation on a high-powered supercomputer.

Most Boeing employees in Hawaii reside on the island of Maui and work side by side with their customer, the U.S. Air Force Research Laboratory's Directed Energy Directorate, on critical research, space surveillance and supercomputing projects. From high atop the 10,000-foot (3,050-meter) Mount Haleakala, Boeing and AFRL employees peer into deep space using the U.S. Department of Defense's largest telescope, the 3.7-meter (12-foot) Advanced Electro Optical System housed at the Maui Space Surveillance Complex observatory. The telescope employs sophisticated sensors enabling it to track man-made objects in space and perform object identification data collection. Other equipment at the MSSC includes telescopes ranging in size from 0.4 to 1.6 meters (1.3 feet to 5.3 feet). The site's work goes on 24 hours a day, seven days a week.

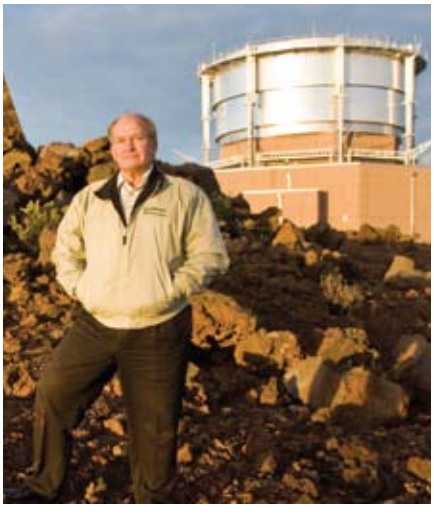


PHOTO: Jerry Cornell, Hawaii site executive, on Mount Haleakala.

Getting to the job—located at the top of the dormant volcano—and back is not your typical daily commute. Company-owned vans pick up employees at three different sites on Maui at 5:30 a.m. for the 90-minute, 47-mile trip, and take them back down at 4 p.m. The ascent is gradual, thanks to 32 switchback turns.

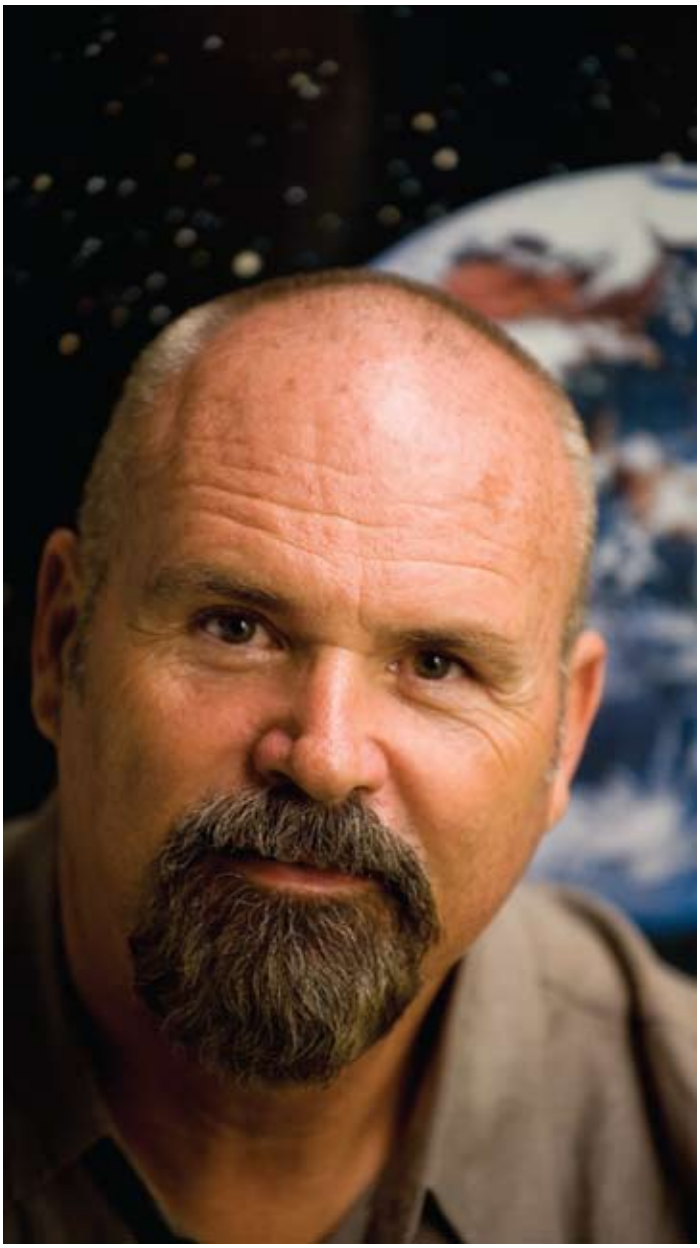
Working 10-hour days atop a 10,000-foot mountain when you live at sea level can be physically arduous. First-timers to the top get a standard safety brief on the major temperature difference from the base to the peak (as much as 30 degrees Fahrenheit, or 17 degrees Celsius) and how to recognize the onset of hypoxia, a lack of oxygen reaching the tissues of the body. Going from sea level to the thinner air of almost two miles high can cause a person's speech to become slurred and thinking processes to become slower, not to mention headaches, muscle fatigue and a frequent need to sit. To help counter these effects, everyone "on top" has a supply of bottled water, extra food and is quick to point out the locations of oxygen stations and disposable masks.

Dan Thiel, a project manager, has worked at the top of the mountain for 20 of his 25 years with Boeing. His duties at the observatory include collecting images of spacecraft passing overhead in orbit. "Seeing through the atmosphere is one of our core competencies," he said. "Maui is the third-best viewing location on the planet because of ideal atmospheric conditions year-round. The island's dry and clean air, relatively stable climate and minimal scattered light from surface sources are perfect conditions to peer into space and see what's going on."

The work of Thiel and his team ranges from collecting images of the Hubble Space Telescope to performing space shuttle–related tasks. One of his most memorable moments occurred in 1995 during a cooperative mission with NASA.

"From the observatory, we directed a laser to illuminate Space Shuttle *Discovery* as it passed over Mount Haleakala with its cargo doors open," he explained. "The pass occurred at night, so the shuttle wasn't illuminated by the sun. The astronauts held a very high-intensity beacon—think of it as a million-candle-watt flashlight—in the shuttle's window. As we transmitted beams up to the shuttle, the astronauts sent back signals from their beacon.

(Continued on Page 38)



PHOTOS: (TOP) "Where else can you say your job is to look at the stars and the planets—the grand tour as we call it," said Dan Thiel, a Boeing project manager who works at the Maui Space Surveillance Complex observatory. **(ABOVE)** Steve Gima, top, and Dean George, high-performance computing systems service engineers, inspect the Dell PowerEdge supercomputer, affectionately known as Jaws.

In this way, with 250 miles between us, we were able to illuminate the cargo bay with just a laser and successfully track the shuttle in the dark!"

The telescopes used at MSSC are high-tech—and incredibly powerful. "These are not like the telescope most people think of, mounted on a tripod and pointed at the Big Dipper," Janki Patel, a project manager, explained. "When we talk about the size of a telescope, we're referring to the aperture or diameter of the primary lens or mirror of the telescope. The aperture size defines the light-collecting capability of the telescope. Our biggest telescope is 3.67 meters. That's about 12 feet.

"Instead of an eyeball, we put a camera on the telescope to collect and record what the telescope sees. When the objects we're viewing are not illuminated by sunlight, we use lasers to illuminate them. We use our telescope to track the object while it's being illuminated and collect data from the object—everything from its size and distance from Earth to how fast it's moving."

Although Boeing employees in Hawaii admit they love their beautiful surroundings, they also face challenges unique to an island setting. "This is not necessarily an easy place to live," Patel said. "You are basically a captive consumer when you live on an island, and supply is a lot less here. Take buying a house for example. On the mainland, if you don't like what you see where you're at, you have the option to move further out. Can't do that on an island. Your options are definitely limited."

Thiel agreed. "Housing, food and gas prices are always high. You can feel very isolated from friends and family on the mainland. Just getting from one place to another on the island can be difficult. We're talking about 138,000 people, all concentrated into a very small part of a 727-square-mile (188,300-hectare) island," he said.

JAWS

Back at sea level, Boeing and the University of Hawaii work together at the Maui High Performance Computing Center in Kihei, providing advanced hardware, tools, training and network connectivity to Defense Department researchers. Boeing conducts research and development programs on one of the world's most advanced computation platforms, named Jaws (after a famous surf spot and not the shark). Jan Wine is an integral part of a management team that provides more than 32 million hours of computing time yearly, supporting cutting-edge applications in four key areas:

- Modeling and simulation (for example, modeling wind flows around a newly designed jet)
- Image processing and information analysis (e.g., taking a satellite image that comes from the MSSC and improving the quality of the image using high-performance computing and software engineering)
- Systems and software integration
- Large-scale data management

"High-performance computing is powering breakthrough discoveries," Wine said. "For example, some of our current projects include modeling and simulation of high-impact weather conditions in the battlespace, modeling and simulation of turbulent flows around aircraft for future aircraft design, and enhancing laser beam qualities for warfighters."

PHOTO: "High-performance computing is powering breakthrough discoveries," said Jan Wine. He is an integral part of a management team that provides millions of computing hours yearly, supporting cutting-edge applications in modeling and simulation, image processing, system and software integration, and large-scale data management.

STORM ON THE MOUNTAIN

The weather also can turn extreme in Hawaii. In December 2007, a fierce storm battered Oahu and Maui for three days. Driving rain and sustained winds exceeding 105 miles per hour (169 kilometers per hour) knocked out power to tens of thousands. On Mount Haleakala, there was not even generator power.

"The site literally shut down," said Maj. Jeff Brach, AFRL director of operations on Maui. "We stood up an emergency operations center in the dead of night in Kihei to make sure the team on top was safe."

During the storm, six members of Cornell's team went up the mountain to stabilize, repair and prevent further damage to the MSSC. Working together over the next several months, Brach and Boeing employees not only repaired the system but also brought one of the sensors online in record time to support a national requirement. "This was definitely an accomplishment we were very proud of," Brach said.

Cornell says this kind of working together in good times and bad is what contributes to the tightknit feeling among Maui employees. Although the Maui site population has decreased over the years, their 2008 Boeing Employee Survey scores jumped a whopping 35 percent from the 2005 survey. Also, the site's contract award fees have seen a 26 percent improvement over the past three years.

In Hawaiian culture, the paddle is a strong symbol of teamwork, because each person's pull in the canoe is just as important as the next's. And, as Cornell puts it, "This Maui team knows how to paddle together!" ■

lynn.farrow@boeing.com

Can't judge a manuscript by its cover

This Boeing scientist helps uncover secrets of ancient documents

When you live in a place where you can swim ocean waters or relax under palm trees year-round, where do you go and what do you do to get away from it all?

Keith Knox resorts to old deteriorated manuscripts.

Knox is the chief scientist for Boeing Laser Technical Services in Hawaii. His work is imaging science—that is, the collection, analysis and visualization of images. Knox leads a team of Boeing scientists who analyze the images obtained from space via the Maui Space Surveillance System. Owned by the Air Force Research Laboratory and located on the 10,000-foot (3,048-meter) summit of Mount Haleakala on Maui, the surveillance system tracks man-made objects in space and plays a critical role in the defense of the United States.

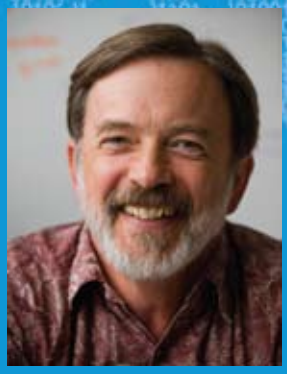


PHOTO: Keith Knox, chief scientist for Boeing Laser Technical Services in Hawaii, analyzes the images obtained from space via the Maui Space Surveillance System. Off the clock, he contributes his time and expertise to help uncover writings on ancient manuscripts.

During his non-work hours, Knox has taken his lifelong expertise at analyzing images and applied it to something he and others consider culturally important. For the past five years in Hawaii and for 10 years prior to that in New York, Knox has spent much of his free time working with university colleagues to uncover writings on ancient manuscripts that have deteriorated over time.

Their prize achievement so far has been the Archimedes Palimpsest—a copy of some of the 2,300-year-old writings of mathematician, physicist and engineer Archimedes, who lived in the third century B.C. and is considered one of the world's greatest thinkers.

Archimedes is most noted for his mathematical treatises and contributions made to the understanding of fundamental physical phenomena. Through the medium of geometry, he was

(Continued on Page 41)

Maintaining greatness

IDS Oahu employees repair, maintain and train on Boeing aircraft

They may work on an island of tropical flowers, fiery sunsets, and majestic peaks and waterfalls, but Boeing employees on Oahu know the work they do is not only difficult—it's critical. In fact, it can be lifesaving for pilots, aircrew, and the soldiers and marines who fly in combat zones on aircraft repaired and maintained in Oahu by Integrated Defense Systems' Global Services & Support employees.

The site supports Boeing aircraft and platforms including:

- C-17 military jet transport (known for its ability to carry large combat equipment and troops across international distances)
- C-40B jet (a specially configured 737 that provides safe and reliable travel for U.S combatant commanders and other top-ranking government officials)
- CH-47D Chinook helicopter (a versatile, twin-engine, tandem rotor heavy-lift helicopter used to transport personnel and military and humanitarian supplies)
- Tomahawk Cruise Missile Planning System (an all-weather submarine- or ship-launched land-attack cruise missile)

"People think when you work in Hawaii, you're out on the beach surfing," said Ron Sampson, Boeing C-17 base manager at Hickam Air Force Base. "For me, a flight line is a flight line, and it's definitely hard work." Sampson and his team of 10 are responsible for maintenance issues that fall outside the scope and capability of U.S. Air Force maintainers on C-17s that fly in and out of Hickam, as well as a fleet of eight C-17s at the base.

"When a C-17 takes off from here it faces a seemingly endless expanse of ocean with nowhere to land for a long, long distance. Pilots and flight crews have to be confident that when they get into a C-17, it's going to fly safely and land where it's supposed to. Instilling that confidence is our job. We designed and built this aircraft. We're the experts when it comes to repairing it."

TRAINING FOR THE UNEXPECTED

Ensuring pilots maintain proficiency on the C-17 aircraft is the job of Larry Leonard, site manager for the C-17 Aircrew Training System, and his team of 14 subcontractors. Pilots are required to complete a minimum of two simulation sessions per quarter on the C-17 Weapons System Trainer. Training focuses on instrument procedures and real-world operational and mission scenarios, such as safety malfunctions during various weather and environmental conditions.

PHOTO: "When a C-17 takes off from [Hawaii] it faces a seemingly endless expanse of ocean. ... Pilots and flight crews have to be confident that when they get into a C-17, it's going to fly safely and land where it's supposed to," said Ron Sampson, Boeing C-17 base manager at Hickam Air Force Base, Hawaii.

C-17 pilots are trained to face any and all emergency situations. "For example, you could be flying a simulated mission assisting earthquake victims when suddenly the aircraft has pressurization problems, the weather turns bad and, just to make things interesting, one engine stalls," Leonard said. "The simulator is perfect for keeping pilots safely prepared and trained for any type of scenario."

Another high-profile jet based at Hickam is the C-40B, a specially configured 737 equipped with state-of-the-art avionics and onboard communications systems. It is the job of Keith Dye, Boeing C-40B site manager, and his logistics support and services team to ensure the aircraft are fully mission-capable at all times.

Last year the team's Fully Mission Capable rate was 99.6 percent, meaning the planes were almost always ready to go. In his five years with Boeing, Dye and his team have had a 100 percent departure reliability rate, meaning there have been no departure delays.

A few miles from Hickam, at Wheeler Army Airfield, a lone field service representative, Galen Cajigal, is passionate about his

job: maintaining and repairing the CH-47D Chinook. When a Chinook returns from a combat tour, it is put through an extensive maintenance and repair process.

"Overseeing repairs is a perfect fit for me, and very gratifying," Cajigal said. "I joined Boeing last April because I wanted to pass along what I've learned in 26 years flying the Chinook as a senior inspector. There are a lot of young soldiers flying this aircraft, so I want to help them out."

"We tear the Chinooks down, thoroughly clean and overhaul them, change out components, then put them back together again with a new paint job," said Chief Warrant Officer Jason Franzen, one of the U.S. Army's maintenance test pilots, who works closely with Cajigal. "When I served in Iraq with the [B Company, 214th Aviation Regiment] 'Hillclimbers,' we flew these Chinooks more than 12,000 hours in 15 months. Every aircraft made it back safely to home station. There is nothing more satisfying than that. To have been part of a group of professionals that kept these aircraft flying safe for that duration in combat is an honor."

STAYING CONNECTED

Jim Pasquino and Dave Brostrom run the IDS business development field marketing office in Honolulu. They are a key interface between Boeing and the U.S. military.

"Oahu is unique because you have three four-star general commands, three three-star commands, and numerous two- and one-star headquarters all located within a few miles. All of these have commands throughout Asia, making Oahu a critical element in understanding customer requirements.

"When Boeing business unit representatives come to Honolulu to talk to these commands, their visits are coordinated through this office so there are no schedule conflicts. Because we talk to state and local government, U.S. military, and international customers, we stay cognizant of current and emerging requirements and provide that information to the appropriate Boeing business unit," Brostrom said.

– Lynn Farrow

PHOTO: Chief Warrant Officer Jason Franzen, left, and Boeing's Galen Cajigal work together to maintain and repair Boeing CH-47D Chinooks at Wheeler Army Airfield on Oahu in Hawaii.

able to elucidate the principles for such basic devices as the pulley, fulcrum and lever. He is also credited with the discovery of the principle of buoyancy. His research into volume and density was fundamental to the development of theories of hydrostatics, the branch of physics dealing with liquids at rest.

By the 12th century A.D., this parchment manuscript copy containing Archimedes' theorems was in the hands of a monastery. There (during a time when parchment was hard to obtain), monks unbound and washed the pages containing the theorems so that they could be reused for liturgical text. The pages were scrubbed with natural acid and pumice stone, and prayers were literally penned on top of scrubbed-off writings.

Fortunately, even though the ink was scraped off, it left stains behind that are barely visible to the naked eye. That's where Knox and his expertise in sophisticated imaging techniques come in. Since 1998, he and two university colleagues have been working with the Baltimore-based Walters Art Museum to apply advanced image processing techniques to uncover the erased images. "The challenge was to sort out which lines of handwriting were faded 10th-century Archimedes text and which were 13th-century markings of a monk," Knox said.

The team used X-rays as well as ultraviolet, infrared and visible light to "excite" and then "relax" the stains left behind on the parchment. Under ultraviolet illumination, the manuscript fluoresces and the erased characters show up as dark images that can be easily seen and interpreted by scholars. The multispectral image processing software that Knox created made the Archimedes text pop out on a computer screen in red-tinted pixels, while the prayer book text remained black. Over the past 10 years, Knox and his team imaged the entire 174-leaf manuscript, digitally enhanced the images and made them available electronically to scholars worldwide. From these images, scholars have discovered that Archimedes understood the fundamental principles of calculus 1,900 years before they were rediscovered by Isaac Newton.

Knox says he loves his pastime. And he loves his work at Boeing. "I enjoy the discovery of new information," he said. "My whole life is geared around extracting information from things that are less than optimal for observation. Whenever you can extract really interesting or rare data from something that on the surface doesn't seem to have anything of value—that's a thrill!"

– Diane Stratman

No margin for error

New IDS organization provides single-point-of-contact support for U.S. Air Force's National Command Authority air travel needs

By Jarrod Bartlett

When your customer flies the most recognizable airplane on the planet, and holds one of the most powerful offices in the world, customer satisfaction takes on a new level of importance.

Each time a member of the United States government takes off or lands on an extensively modified Boeing VIP aircraft, Boeing's Global Transport & Executive Systems team has to get it right—and with a worldwide audience watching, according to Leanne Caret, general manager of GTES.

"There is no willingness to accept anything less than perfect in this customer's eyes. And when things don't go the way the customer likes, it elevates to the highest levels within our government," Caret said.

The GTES business, headquartered in Wichita, Kan., has approximately 1,000 employees located at nine sites around the world, including the Puget Sound region and Oklahoma City. GTES is responsible for providing service to Boeing's most visible customers—the U.S. Air Force's 89th Airlift Wing, Special Air Missions Group, at Andrews Air Force Base, Md.

The GTES team provides maintenance, modifications, upgrades and support for the Boeing fleet of aircraft that supports the National Command Authority mission—the C-32A, C-40A, C-40B, C-40C, E-6, E-4B and other head-of-state aircraft, military versions of the B-757, Next-Generation 737, B-707 and 747-200, respectively. These aircraft carry the nation's senior leadership on critical missions. And in today's global environment these aircraft are not just about mobility—they must reliably connect and protect the nation's leaders as they carry out the business of the United States.

"Say, for instance, a high-ranking government official or military commander, using an aircraft in the National Command Authority fleet, loses an airborne phone call on a holiday weekend or is delayed for an airplane issue," Caret said. "We don't hear about it two weeks later; we hear about it that holiday weekend."

Until last July, Integrated Defense Systems served the same customer with two different organizations, Derivative Airplane Programs in Seattle and the Special Air Mission business in Wichita. These businesses each were successful in their area of expertise: for DAP, managing within the commercial business model; for SAM, the traditional military world. However, while the Department of Defense and the nation's leaders viewed them as a single fleet of aircraft, Boeing treated them as individual programs. Disconnects and lack of understanding of the interdependency of the entire fleet hampered the success of the programs and frustrated the customers, Caret said.

"We needed to treat these assets as a single fleet, so it wasn't the C-32 versus the E-4B versus C-40," Caret said. "We needed to look at the fleet and understand the impact [of our decisions] on the customer."

To help address this challenge, the presidents of Integrated Defense Systems' Boeing Military Aircraft and Global Services &

Support organizations—Chris Chadwick and Dennis Muilenburg, respectively—decided to bring the capabilities of both organizations into one business. Now merged into a single entity, Global Transport & Executive Systems is a subdivision of the Maintenance, Modifications & Upgrades organization of GS&S. Today, GTES is leveraging the expertise of both organizations in close partnership with Commercial Airplanes to support the customer in a "One Boeing" approach.

Gen. Arthur Lichte, commander of the Air Force's Air Mobility Command, based at Scott Air Force Base, Ill., said Boeing's move to a single business entity is making a difference and has improved communications and customer service.

"By providing a single point of contact into Boeing for all of our 89th Airlift Wing Boeing aircraft, Boeing's recent reorganization has improved two-way communication, simplified collaborative problem solving and enhanced mission effectiveness," he said. "From presidential airlift to support of our nation's top military and civilian leaders, the 89th has a demanding mission that has no margin for failure. AMC appreciates the efforts by Boeing to be more responsive to customer and mission demands."

Examples of benefits for both the customer and Boeing include leveraging new interior and communication systems across the larger fleet, and integrating multiple design and modification efforts to increase fleet availability. One C-32 activity now is being accomplished in a single visit instead of five, saving the customer 38 days of downtime for the aircraft, Caret said.

"[Air Mobility Command] appreciates the efforts by Boeing to be more responsive to customer and mission demands."

– Gen. Arthur Lichte, Air Force commander, Air Mobility Command

Brian Hellings, who leads strategy and growth for GTES, said the new organization is increasing aircraft availability for the customer, thereby improving key mission capable rates. Moreover, the One Boeing approach also positions the company to capture new business opportunities, he said. "Doubling our GTES business in five years is realistic if we do the things we need to do," he added.

Indeed, the new organization gives GTES the opportunity to grow outside its current military focus to new business and customers, including head-of-state aircraft and modification work for Boeing's commercial customers through a partnership with Commercial Airplanes' Commercial Aviation Services. "Whether it's doing work for Commercial Airplanes or Boeing Capital Corp. internally or servicing our customer set externally, there's power in bringing these two organizations together," Hellings said.

Brian Cassidy, who is helping manage the transition to a single GTES organization, says the team is making a smooth changeover to a single customer-facing organization and operating as One Boeing. But as with any merger, there are challenges.

"With nine different locations … we have to learn how to operate in a virtual environment. Moreover, we had very different cultures. Now we're going to end up with a new culture that's driven and created by managers and employees," Cassidy said.

One of the biggest tests for the new organization will be combining the strengths of each organization to win new business. GTES has built a best-of-industry team including L-3 Communications and Greenpoint Technologies to compete for new programs. One advantage: Boeing currently has a large, security-cleared work force to support presidential aircraft.

According to Caret, the timing of the integration of the two businesses couldn't be better for this One Boeing team. "We have the opportunity to combine the strength of our commercial and defense businesses, focus on integrating some of the most complicated technology in the world under strict security standards and an overarching quality requirement, and create a legacy for the next 50 years." ■

jarrod.s.bartlett@boeing.com

PHOTOS: (FAR LEFT) Then U.S. President-elect Barack Obama boards a C-32A on Jan. 4, 2009, for his official flight to Washington, D.C. The C-32A is a heavily modified Boeing 757 used for the National Command Authority mission, which connects, protects and transports government and military leaders. The C-32A is maintained, modified and upgraded by Boeing's Global Transport & Executive Systems business in Wichita, Kan. GETTY IMAGES **(LEFT)** Employees in Wichita, Kan., perform modifications on a C-40A for the U.S. Navy. The C-40A provides safe and reliable transportation for the Navy's critical worldwide fleet logistics support mission. BOB FERGUSON/BOEING

Picture this!

Computer graphics and sophisticated automation ensure smoother, safer operations at Boeing widebody paint hangars

By Bill Seil

The importance of graphics at Boeing widebody paint hangars goes well beyond the livery on airplanes. Automation that supports the operation of these hangars, located at the company's Everett, Wash., plant, uses computer graphics to present a clear view of the buildings' complex systems. These include a new collision avoidance system, which has been highly effective at preventing painting platforms from coming in contact with airplanes.

The development of the collision avoidance system by Boeing and Concept Systems Inc., of Albany, Ore., is a prime example that persistence and determination to "find a way" can overcome obstacles.

The most sophisticated automation can be found at the plant's 45-03 paint hangar, which recently underwent a complete upgrade. The automated systems are linked into a common computer network used to manage the hangar's operation. Computer graphics show the position of painting platforms—such as "crane stackers," which are large movable platforms that carry painters and equipment, and wing and tail stands—relative to the airplane. Overall, the computer images give maintenance personnel clear, real-time information on the status of the hangar's many systems. Paint supervisors can check a computer station to get precise information on their work environment and equipment.

"Graphics are better than data because everybody understands them," says Neil Kuntz, an automation designer for Shared Services' Everett Site Services Plant Engineering. "They give you a quick look that provides a lot of detailed information."

The 20-year-old 45-03 paint hangar—which is now used for 787 and 777 airplanes—was badly in need of modernization in 2006 when design work began. Bill Dill, Commercial Airplanes decorative paint operations senior manager, told Kuntz he wanted a collision avoidance system that was 100 percent effective and did not interfere with the work of the painters.

"I'll have to say, this caused a little panic," Kuntz said. "He was asking quite a lot. But this led to some intense research by us and Concept Systems, our systems integrator, that resulted in this highly effective new system."

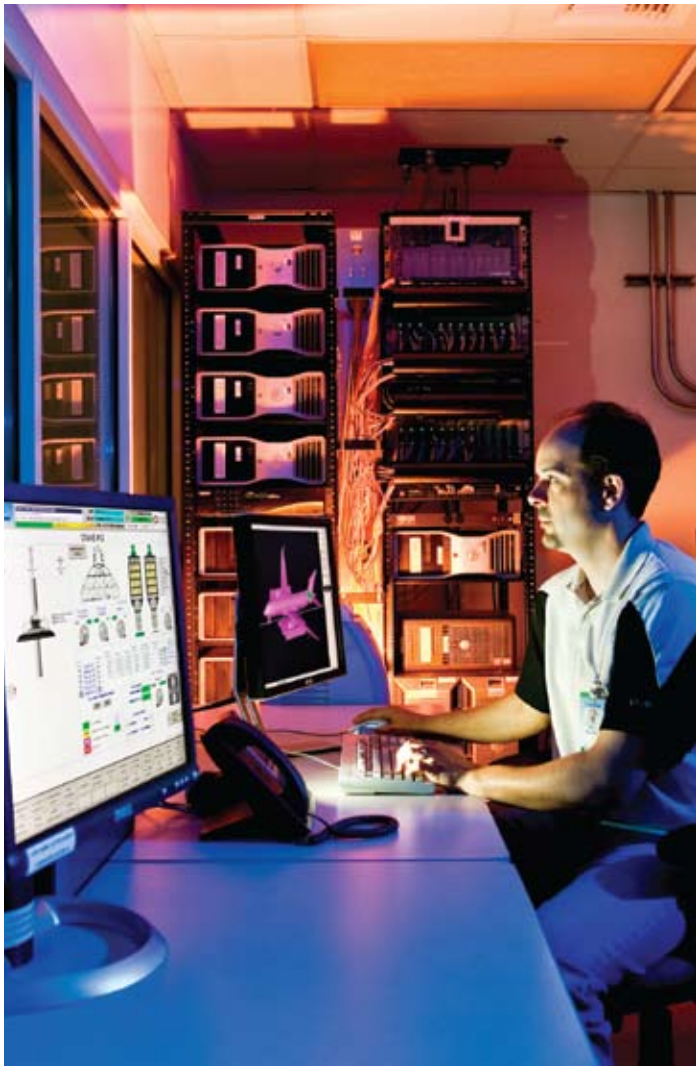


PHOTO: Neil Kuntz, automation designer for Everett Site Services Plant Engineering, monitors systems from the control room of the 45-03 widebody paint hangar at the company's Everett plant. The newly installed systems are linked to a computer network that is used to manage the hangar's operations. GAIL HANUSA/BOEING

Concept Systems uncovered a new software called Proximity Query Package (PQD), which had been developed by the computer science department at the University of North Carolina, Chapel Hill. The PQD application, along with CATIA digital plane dimensional data, was embedded into a custom collision avoidance software package for the paint hangars.

Kuntz, who prepared the automation design specifications, said the goal of the upgrades was to provide technology to support painters' needs without creating overly complicated, difficult-to-maintain systems.

New, more sophisticated equipment was installed and linked into a network. New crane stackers and wing stands were installed. The building's processed air and solvent recovery systems were replaced, as was the basic infrastructure, including lighting and pumps.

"From an automation standpoint, this is the first building where we've substantially networked all of our equipment," Kuntz said. "It's fully integrated, so all the systems are talking to one another. For instance, the crane stackers always know where they are relative to the airplane and each other."

Kuntz sees the new collision avoidance system as the most successful project of his Boeing career. Various systems to prevent crane stacker contact with airplanes have been in use since the hangar was built, but until now the results were sporadic.

If a moving or repositioning crane stacker touches an airplane, damage can range from a scratch in the paint to a dent. In worst-case situations, airplanes must be sent back to the factory for repairs.

"The crane stackers are very large, so the potential for damage is very serious," Dill said. "The painters are focused on painting the airplane and they can't see every point where the stacker could come in contact with the product." Since the collision avoidance system has been installed, "we haven't had any significant incidents," Dill said.

The concept behind the collision avoidance system is simple. After each airplane is rolled into the paint hangar, it is scanned with a theodolite coordinate measurement system. This sophisticated tool precisely measures the airplane position relative to the hangar structure and painting equipment. Data from the scan, along with the aircraft model, engine type and flap positions, are used to create an accurate 3-D model in the computer system. Specialized software tracks and prevents contact between the airplane and the crane stacker.

Dill and his decorative paint operations team have found the new collision avoidance system to be highly reliable—greatly reducing the risk of airplane damage. It also helps them to keep pace with fast-paced production schedules.

Dill and his line managers and painters also speak highly of the building's new automated systems. Line managers say they are able to look at the graphic displays and instantly understand what is currently taking place. System problems can be tracked down and resolved more quickly. Supervisors enjoy being able to go to a computer and call up activity reports—something they weren't able to do previously.

Kuntz, a Boeing employee for more than 20 years, has spent most of his career working on ways to ensure that the widebody paint hangars operate smoothly and identifying technologies that can improve their operation. He believes this latest upgrade has been particularly effective, demonstrating how the Shared Services Group has been a valuable partner in helping its Commercial Airplanes customer work better.

"The thing I love most about this job is the technology; it's constantly changing," Kuntz said. "Sometimes it's tough keeping up with all the advancements, but it's never boring. The ultimate satisfaction comes when those advancements improve efficiency and the work environment." ■

william.j.seil@boeing.com

PHOTO: Everett Site Services Plant Engineering automation designer Neil Kuntz works on one of the 45-03 paint hangar's crane stackers during the collision avoidance calibration process. The stackers are overhead hoisting platforms that painters operate and ride to allow access to the entire surface of the airplane.

WILL WANTZ/BOEING

Innovation aloft

The 737 Boeing Sky Interior and performance improvements extend 737 market leadership

By Jay Spenser

The world's best-selling jetliner will soon be even more popular for airlines and passengers alike. On April 28, Boeing unveiled the 737 Boeing Sky Interior—a new passenger cabin for the Next-Generation 737 based on the 787 Dreamliner—and a suite of performance improvements that will further enhance the twinjet's operating costs, fuel consumption and environmental performance.

"Boeing recently delivered its 6,000th 737 and more than 2,000 Next-Generation 737s are on order," said 737 Chief Project Engineer John Hamilton, Boeing Commercial Airplanes. "This record attests to the 737's proven ability to continually incorporate improvements that add value to the customer."

REDEFINING THE 737 FLYING EXPERIENCE

The all-new 737 Boeing Sky Interior will debut in service in late 2010. Inspired by the 787 Dreamliner's advanced interior, it's a cabin design that promises to redefine the 737 travel experience. Seven airline customers already have ordered this interior, which is optional for existing Next-Generation 737 operators but standard for all new customers.

Boeing also announced a performance improvement package offering a 2 percent reduction in fuel consumption through various airframe and engine improvements. Airplanes delivered from mid-2011 onward will see these benefits.

"The changes mark the latest chapter in a history of continuous innovation that began when the 737 first entered service three decades ago," Hamilton said. Since then, 737 operators worldwide have benefited from constant infusions of value-added technology, including two major-derivative updates, each of which delivered an essentially new airplane.

Boeing's dedication to ongoing improvement is clear in today's Next-Generation 737. Available in four model sizes seating from 110 to 220 passengers in a two-class configuration, the Next-Generation 737 family boasts many technological firsts, including its fuel-saving blended winglets, advanced flight-deck displays, and satellite-based navigation and landing capabilities.

737 BOEING SKY INTERIOR

At the Customer Experience Center in Renton, Wash., south of Seattle, airline customers can walk through mock-ups of Boeing jetliner interiors. Lately, one new mock-up has been surprising airline executives familiar with the Next-Generation 737. On entering the Dreamliner-inspired 737 Boeing Sky Interior, they often think they're in a different airplane.

"We had a couple of airlines' executives who just couldn't believe we hadn't widened the 737 fuselage," said Alan Wittman, 737 Boeing Sky Interior program manager, Engineering. "The chief financial officer of one even asked us for a tape measure so he could check the cabin width for himself. What a wonderful validation of our intended architectural impact!"

How can this new cabin be so different? The answers begin at the threshold, where cove lighting, curving architecture and softer accents create a more spacious and welcoming entryway. Passengers boarding from the jetway will sense immediately they've left behind the airport hustle and bustle and can relax.

As they proceed down the aisle, they'll find things very different. Instead of shelf-type stow compartments bordering the aisle, the 737 Boeing Sky Interior features stow bins that tuck up and out of the way when closed. "The result: a roomier, more open in-flight environment with unobstructed views, whether passengers are standing or seated," said Kent Craver, regional director, Passenger Satisfaction and Revenue. And for the first time in any single-aisle jetliner, window-seat passengers can get in and out of their seats easily and gracefully.

PHOTO: Stepping aboard a Next-Generation 737 with the new 737 Boeing Sky Interior, passengers will notice that the new entry offers a welcoming transition from the jetway. Cove lighting and curved architecture create a distinctive entry and greater openness in the cabin. BOEING

Years of research went into these 787-style pivoting bins, which Boeing first introduced on the 777. Because they more closely match the shape of standard carry-on roller bags, the bins maximize the space for overhead stowage. With more bags stowed above, there's more legroom available below.

"Functionality was our No. 1 priority with the pivoting bins," said Dean Habersetzer, manager for the 737 Boeing Sky Interior at the Interiors Responsibility Center, which is part of Commercial Airplanes Fabrication. (See sidebar on Page 49.) "Of course, we also considered weight, cost, ergonomics, reliability, manufacturability and certification requirements. The result is a breakthrough bin design that will let 737 passengers store more luggage closer to their seats, yet contributes to a more open cabin environment."

These bins also feature an easy-to-use latch that works whether passengers pull or push it from either the top or the bottom. The latch was developed for the 787 and, in fact, is the identical part. This commonality is another example of Boeing's focus on saving airlines money by reducing spares provisioning requirements.

Several centers of excellence across Boeing collaborated to create the 737 Boeing Sky Interior. Among these is Teague, the industrial design firm that has teamed with Boeing in airliner interior developments since the propeller era. Teague experts and their Boeing counterparts work side by side—often at the Commercial Airplanes Payloads Concepts Center—to advance the state of the art.

"By adapting the look and feel developed for the twin-aisle 787 to the world's most successful single-aisle airplane, this interior

"By adapting the look and feel developed for the twin-aisle 787 to the world's most successful single-aisle airplane, this interior promises air travelers a greater sense of familiarity and continuity."

– Miguel Remedios, lead Teague designer, 737 Boeing Sky Interior

promises air travelers a greater sense of familiarity and continuity across the Boeing product line," said Miguel Remedios, lead Teague designer for the 737 Boeing Sky Interior. "This will be true whether they board a Next-Generation 737, 787 Dreamliner or 747-8 Intercontinental."

Carried over from the 787, an advanced light-emitting diode (LED) lighting scheme washes the ceiling with blue light, which suggests an open sky overhead and makes the airplane feel more spacious.

New sidewalls also foster a connection to the sky. Sculpted window reveals direct passengers' eyes outside. The windows themselves, now rounder, are also slightly larger because they use all the available viewing area of the external windows, unlike the squared design on current 737s.

At the base of these sidewall panels, new integrated air return grilles have been made tamperproof, which saves inspection time for airlines required to perform security checks before flights. Together with a revised installation of noise-damping material against the airplane's interior skin, the revised grille also makes for a quieter cabin.

Other improvements also make the 737 even more pleasant for passengers. For example, those reaching up for the reading-light switch will be less likely to press the attendant call button by accident, thanks to a more intuitive design inspired by the 787. Airlines will spend less time and money replacing light bulbs because the LED reading lights last 40,000 hours—10 times as long as the current halogen bulbs. And cabin announcements will be easier to hear because each row now has its own speakers.

"Everything that our 737 Boeing Sky Interior team has accomplished reflects an overarching Boeing interiors philosophy, as pioneered with the Dreamliner, which is to reconnect passengers with the magic of flight," Craver said.

The 737 Boeing Sky Interior also promises to help Boeing operators succeed through faster and easier boarding and deplaning, increased passenger preference and enhanced perceptions of the airline's brand. In turn, these factors help set the stage for increased market share and higher revenues.

PERFORMANCE IMPROVEMENTS

Complementing the new interior is a package of Next-Generation 737 performance improvements that targets a 2 percent fuel consumption improvement by 2011. Aerodynamic refinements to reduce airframe drag will yield about half this improvement, with changes to the airplane's CFM56-7B fanjet engines providing the rest.

"The Next-Generation 737 already is the most efficient airplane in its class, so finding changes to make it even more so was highly challenging," said Ed Kane, chief engineer for 737 Product Development. "What our engineering team ultimately came up with is a suite of changes that are relatively simple to make. In fact, a number of these modifications could potentially be retrofitted as interchangeable parts that operators could use in place of current airplane components."

Continental Airlines will make a 737-800 available to Boeing to flight-test the engine and airframe improvements, which promise to further solidify the 737 family's market leadership.

"These performance enhancements offer our customers a significant opportunity to reduce their fuel consumption and operating costs," said Jon Robinson, 737 Performance Improvement Package team leader. "They also offer environmental benefits in terms of reduced carbon emissions. At Boeing, we are committed to doing the right thing, and this is another step in that direction." ■

jay.p.spenser@boeing.com

PHOTOS: The new 737 Boeing Sky Interior features sculpted window reveals to direct the passenger's eyes to the view outside the window; larger stowage bins that pivot up and out of the way to create more headroom and more room to store bags; and an air return grille that is integrated into the sidewall to create a quieter cabin. BOEING

Interiors Responsibility Center

In a nondescript building at the Boeing plant in Everett, Wash., is a remarkable organization that supports the new 737 Boeing Sky Interior. Employees with the Interiors Responsibility Center—part of Commercial Airplanes Fabrication—played a major role in defining and prototyping this new passenger cabin and will provide it with finished components.

The IRC designs, manufactures, assembles and integrates overhead stowage compartments, sidewalls, ceilings, crew rests, closets, partitions and other furnishings for Boeing jetliners. A global Boeing center of excellence, the IRC competes with other airliner interiors suppliers around the world for the company's business, a requirement that keeps it agile.

With engineering and manufacturing capabilities all housed under one roof, the IRC can move as quickly as an independent company. "Morale is high among our dedicated employees. We also pride ourselves on our Lean+ philosophy and we've achieved dramatic reductions in flow times and inventory," said Dean Habersetzer, the IRC manager responsible for the 737 Boeing Sky Interior.

Today, almost all of the IRC's major deliverables—from stow bins to crew rests to sidewalls—are built on moving assembly lines. Production processes ensure that these interior components are delivered when and as needed to the twin-aisle Boeing jets built in Everett and the single-aisle Next-Generation 737s assembled in Renton, Wash.

"The IRC is proud of its role in the 737 Boeing Sky Interior, which it helped define and whose production it will support," Habersetzer said. "Among the many important capabilities we brought to this effort was the ability to rapidly prototype whatever people could imagine. For example, we turned out early versions of the pivoting bins that proved invaluable for testing, design reviews and trial installations in engineering mock-ups. And we made sure to get feedback from the assembly-line technicians who will install 737 Boeing Sky Interiors in new Next-Generation 737s beginning late next year."

PHOTO: Engineer Jeri Imhoff demonstrates the more intuitive placement of buttons in the passenger service unit inside a mock-up of the new 737 Boeing Sky Interior located at the Customer Experience Center in Tukwila, Wash. The service unit was redesigned based on passenger research conducted for the 787 Dreamliner. Engineers Steve Lin and Brent Walton look on with Kent Craver, regional director of Passenger Satisfaction and Revenue for Boeing Commercial Airplanes. MARIAN LOCKHART/BOEING

"Early on, the IRC and the 737 Program committed to a 'One Team' approach for our part of this major cabin development effort," added Brent Walton, the 737 Boeing Sky Interior manager for Engineering, Commercial Airplanes. Experts from both camps relocated to the Boeing campus in Bellevue, Wash., which is about halfway between Everett and Renton. "We worked side by side for almost a year before returning to our home organizations. That one-team collaboration ensured a better product and fewer problems than would otherwise have been possible," Walton explained.

– Jay Spenser

Connect with the legend …

through the Boeing Store

"The Boeing Store gives people a concrete way to express their affection for the company and its products."

– Jim Newcomb, director of Brand Management and Promotion

PHOTO: In addition to offering Boeing-themed merchandise, the Boeing Store protects company trademarks and promotes the Boeing brand. BOB FERGUSON/BOEING

By Carrie Howard

Boeing employees love their work so much they would take it home with them—if only they could fit a jet fighter, helicopter or commercial aircraft in the garage.

That's where the Boeing Store can help. "It's impossible for people who build products that cost tens of millions of dollars each to take home a piece of their work," said Jim Newcomb, director of Brand Management and Promotion. "But they can own a desktop model or a logo T-shirt, and those little things mean a lot.

"Employees and retirees are proud of the things they've done at Boeing, and we at the Boeing Store are working to create a venue where they can express that pride."

Boeing sites operated ad hoc gift stores for years, selling everything from T-shirts to aspirin to appliances. In the late 1990s, the stores were centralized under Boeing Stores Inc., a subsidiary that reports to Brand Management and Advertising. The objective was to create a self-sustaining, break-even business that would protect company trademarks, promote the Boeing brand, and offer reasonably priced merchandise to employees, Boeing fans and aerospace enthusiasts around the world.

"Our association with Brand Management gives us immediate access to brand expertise and design approvals for store merchandise as well as special-order items," said Mike Wasch, senior manager of Boeing Stores. "That ensures that we are always closely aligned with the company's brand strategy and promotional efforts."

Employees can use Pride@Boeing and service award points to make purchases at the stores; special sales and discounts are offered frequently throughout the year. Some stores are open extended hours to serve second- and third-shift employees, and BoeingStore.com is available around the clock for online shopping. A traveling store makes more than 400 visits to 43 Boeing or supplier/partner sites every year. Boeing Stores also is a Shared Services preferred provider for custom merchandise orders and works with authorized resellers to offer Boeing merchandise at museums, flight shops and airports in targeted locations around the world.

While retail sales declined across the country during the first quarter of the year, Boeing Store sales remained strong. Customer

service is an important component of the stores' success and the brand experience. Kelly Yamamoto, sales and marketing manager, said: "We get complimentary letters about our customer service all the time. Even in this poor economy, we got more letters in the first quarter of this year than we did all last year. It's amazing how many people take the time to write us." Customers laud the sales staff's efforts to find exactly the right gift, locate and deliver an item in a certain size or color, and even answer questions about the company and its products.

"You have to search for a salesperson in the big department stores now," Yamamoto said. "But when people come into our stores, I can guarantee they'll be well taken care of."

Boeing Store managers and staff are not just employees of the stores—they're also customers. "My older brother is a tech guy," Newcomb said. "So whenever I'm struggling with a gift idea for him, I know I can send him something from the Boeing Store and he will always love it. A friend of his saw an airplane model I gave him and liked it, so we sent the friend a snap-together model, and it's sitting on his desk at work now. Little gestures like that bring people closer to Boeing.

"Everyone enjoys being connected to a legend. The Boeing Store gives people a concrete way to express their affection for the company and its products," Newcomb said. "It's not just about sticking a logo on a T-shirt. It's about pride and personal ownership of what the Boeing brand means." ■

PHOTOS: (ABOVE) Customer service is a top priority for Boeing Store sales staff, who help customers find the right gift as well as answer questions about the company and its products. BOB FERGUSON/BOEING

(BELOW) The Boeing Store recently introduced the Boeing Heritage Collection, celebrating the company's rich legacy in aerospace with designs that display heritage company logos and historic aircraft. JIM COLEY/BOEING

Boeing Store at a glance

Retail locations: 14, plus a traveling store
Web site: www.boeingstore.com
Product selection: More than 1,000 different items

Aircraft models sold (2008): 41,220
T-shirts sold (2008): 90,710
Pens sold (2008): 125,840

Boeing Company – **BA**

NYSE: Industrials/Aerospace & Defense

As of 5/22/09

$42.94

Stock snapshot

52-week range:	
52-week high	**$88.60**
52-week low	**$29.05**

International competitors

EADS* – **EAD.PA**

As of 5/22/09	**€11.30**
52-week range:	
52-week high	**€16.68**
52-week low	**€8.12**

**prices in Euros*

U.S. stock indexes

S&P 500

As of 5/22/09	**887.00**
52-week range:	
52-week high	**1,419.12**
52-week low	**666.79**

S&P 500 Aerospace and Defense Index

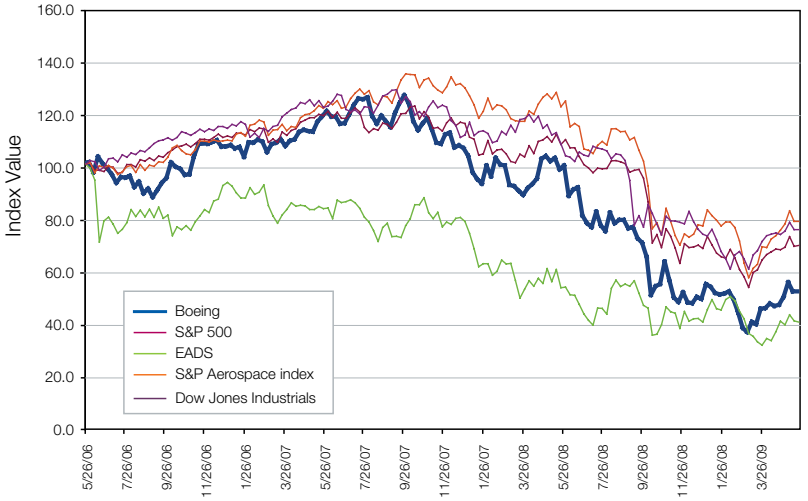
As of 5/22/09	**269.42**
52-week range:	
52-week high	**426.49**
52-week low	**194.13**

Dow Jones Industrials

As of 5/22/09	**8,277.32**
52-week range:	
52-week high	**12,926.70**
52-week low	**6,440.08**

Stock price chart

The chart below shows the stock price of Boeing compared with other aerospace companies, the S&P 500 index, the S&P 500 Aerospace and Defense Index, and the Dow Jones Industrials. Prices/values are plotted as an index number. The base date for these prices/values is May 26, 2006, which generates three years of data. The prices/values on that date equal 100. In other words, an index of 120 represents a 20 percent improvement over the price/value on the base date. Each data point represents the end of a trading week.



Boeing stock, ShareValue Trust performance

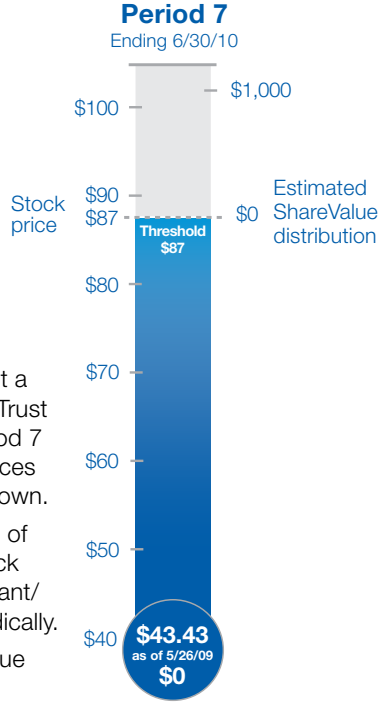
Sharevalue Trust is an employee incentive plan that allows eligible employees to share in the results of their efforts to increase shareholder value over the long term.

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

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

The share price shown is the average of the day's high and low New York Stock Exchange prices. Updates to participant/employment data will be made periodically.

For more information on the ShareValue Trust, visit www.boeing.com/share.



Around Boeing

PHOTO: A UK Royal Air Force Boeing C-17 lifts off from Basra in Iraq. IAN DANIELS/ROYAL AIR FORCE

UK C-17S LOG 50,000 HOURS

The UK Royal Air Force fleet of six C-17 Globemaster III airlifters surpassed 50,000 flying hours in late April, during a mission home from Afghanistan.

"The C-17 is a remarkable airlifter in every way imaginable, from mission readiness and reliability to its flexibility in being able to handle tough tasks," said RAF Air Marshal Kevin Leeson, assistant chief of the defense staff for logistic operations. "I can't imagine operating without them."

"This accomplishment is a testament to the RAF and to the Boeing employees who build this reliable, durable aircraft and support our customers' maintenance crews around the world, 24 hours a day," said Jean Chamberlin, Boeing vice president and general manager, Global Mobility Systems.

The RAF received its first C-17s from Boeing in May 2001. The aircraft, assigned to 99 Squadron at RAF base Brize Norton near London, provide critical airlift capability for the Joint Rapid Reaction Force. Brize Norton is RAF headquarters for strategic air transport and air-to-air refueling.

The RAF was the first international C-17 customer to utilize a unique "Virtual Fleet" concept developed by the U.S. Air Force and Boeing. "The virtual fleet structure ensures cooperative support and spares to the RAF fleet no matter their geographic location," said Gus Urzua, Boeing vice president and program manager for the C-17 Globemaster III Sustainment Partnership.

Currently, 202 C-17s are in service worldwide—14 with international customers. The U.S. Air Force, including active Guard and Reserve units, operates the remainder. International customers include the RAF, the Canadian Forces, the Royal Australian Air Force, Qatar, and the 12-member Strategic Airlift Capability consortium of NATO and Partnership for Peace nations. The United Arab Emirates announced in February that it will acquire four C-17s.

WIRELESS SYMPOSIUM BOLSTERS COLLABORATION ACROSS BOEING

A three-day symposium in Everett, Wash., recently drew together more than 200 Boeing researchers, designers and employees who use wireless equipment and systems to share how wireless technologies are being developed and utilized throughout Boeing.

The event was co-sponsored by Commercial Airplanes' Onboard Wireless Systems Integration Group (OWSIG) and Boeing Information Technology, with support from Shared Services Group's Frequency Management Services (FMS).

"The demand for wireless technologies and access to radio-frequency (RF) spectrum is expanding," said Frank Whetten of OWSIG in Everett, who organized the event. "This dynamic underscores the need to be more integrated as a company as we work through these issues—from product development to operations."

RF spectrum is a limited resource that is highly regulated by governments around the globe. Boeing coordinates authorizations for spectrum use to support programs and operations across the company in both commercial airplane and military platforms.

"This event supports our goal to implement a common strategy to acquire and manage spectrum for multiple purposes across Boeing," said Audrey Allison, FMS director in Washington, D.C.

BOEING RECEIVES GLOBAL GREEN 100 AWARD

Boeing Information Technology was recognized by the Uptime Institute for its "outstanding commitment to energy efficiency in very large-scale enterprise computing and data center environments."

Uptime presents the annual Global Green 100 award to Fortune 500 and Information Week 500 companies taking a visible, effective leadership position in the "greening" of enterprise computing.

The Boeing IT Computing and Network Operations (CNO) organization, which operates and maintains data centers across Boeing, launched the CNO Green IT Project in 2007. Its data center modernization program has significantly streamlined operations to reduce energy consumption.

Such environmental efforts are helping Boeing meet its aggressive goal of improving energy efficiency 25 percent by 2012.

The Boeing Packaging Technical Team

For the past two years, our team of 39 packaging engineers, specialists and support staff from 20 Boeing sites across all business units and programs has dedicated itself to establishing, implementing and sustaining best packaging practices for the Boeing enterprise.

Three years ago, our network was not available. Formed in January 2007 and co-led by Steve Pallardy, IDS manager for Packaging Engineering, and Randolph Roth, Shared Services Group Packaging engineer, today the Packaging Technical Team (http://packaging.web.boeing.com/people.asp) sets an example for every employee in the company who shares packaging engineer job responsibilities—and anyone who needs a part packaged for shipment and storage.

We've made solving packaging problems a companywide activity, rather than an effort limited to co-workers within shouting distance of one another. The high value and critical nature of the parts Boeing packages makes it crucial for each and every packaging job to succeed.

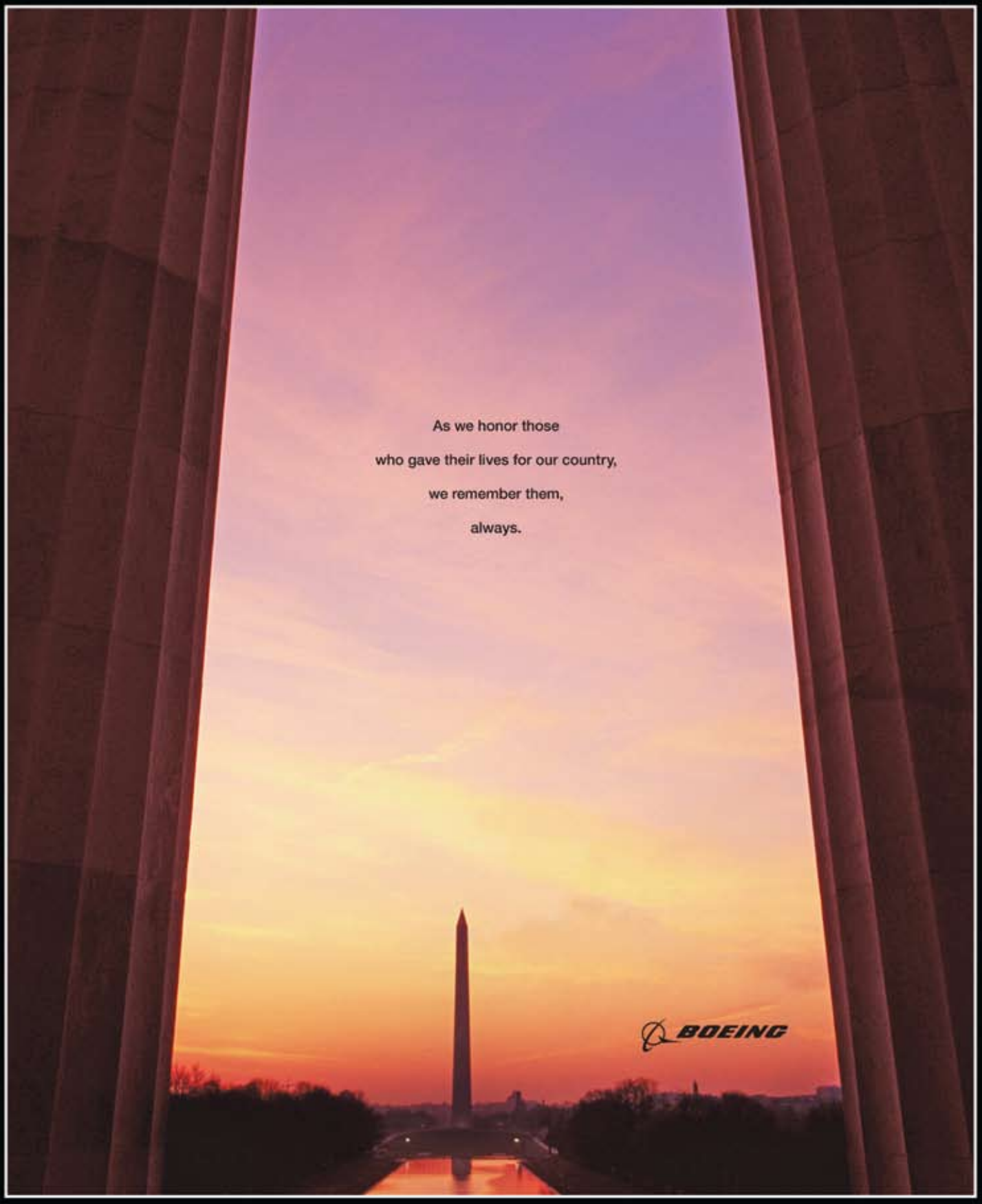
Working as a team, we've found that learning from one another's challenges and accomplishments has been invaluable. Seeing how other sites perform specialized packaging and make transportation plans has inspired us to improve, streamline and lean out our own packaging processes. We've also established—and continue to develop—a series of companywide packaging standards that can be found in Boeing's Product Standards Data System. These include many of our best practices and lessons learned from Commercial Airplanes, Integrated Defense Systems and SSG.

All told, we've saved Boeing more than $2 million through our Lean+ projects. One example is how we handle visits to the customer. By sending a peer in our network who is local to a customer, we avoid incurring travel costs. We've also consolidated site contracts into an enterprise contract, saving Boeing more than 40 percent in cost, for example, in the certification of wood-packaging material. A third case: We regularly share reusable conveyances and packages across the enterprise.

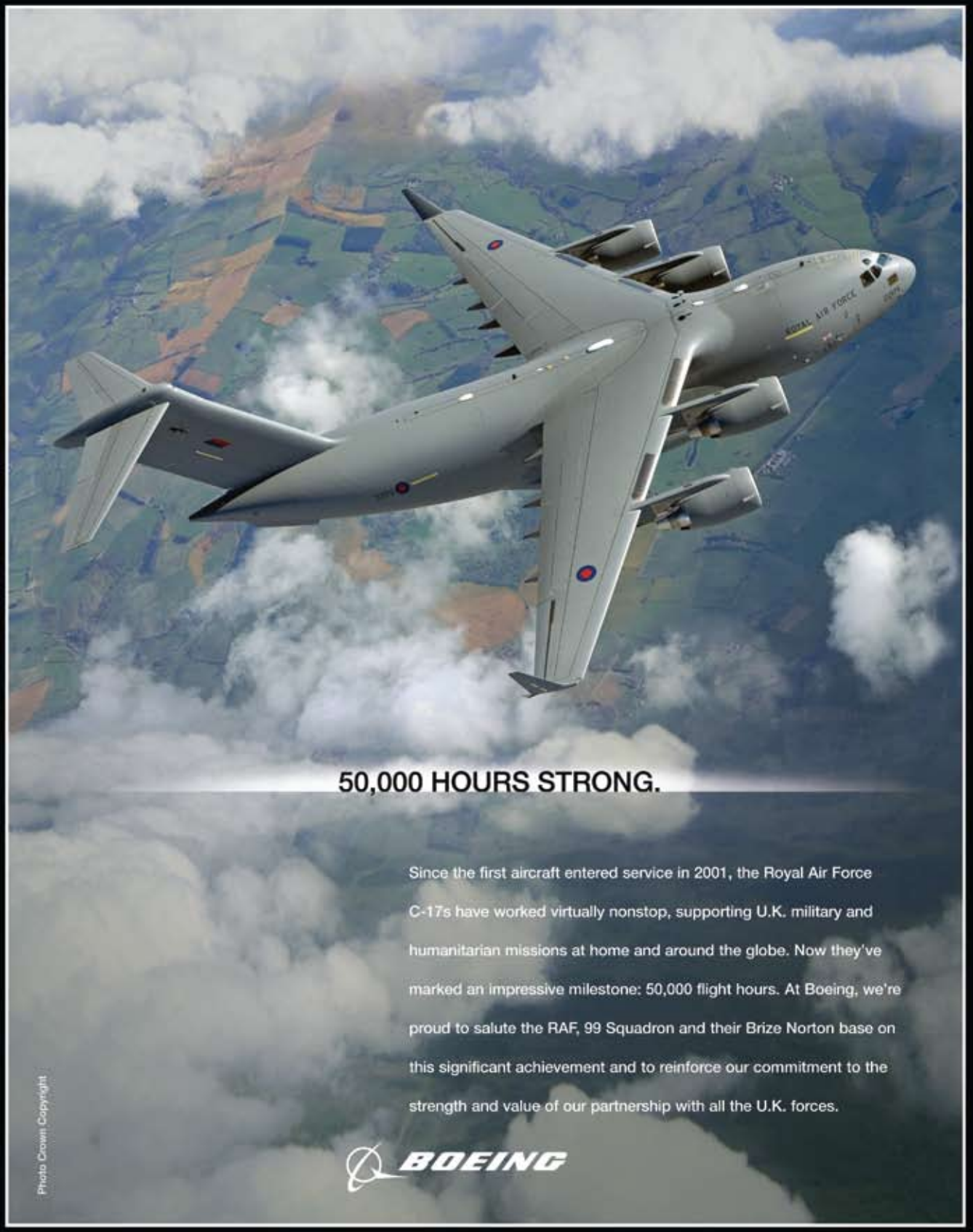
We're proud that our work benefits the environment and saves the company time, materials and money, while enhancing the documentation and knowledge that future generations of Boeing packaging engineers will need to help keep the company competitive worldwide. ■

PHOTO: *Southwest Packaging Technical Team members, from left:* Guy Bredesen, Daniel Biddle Jr., Bob Garcia, Randolph Roth, Brett Adams, Bruce Powell, Nick Bruscha, Julie Larson, Dwayne Henry, Lloyd Mentzer, Kris Haugaard, Mallory Strong. Seated: Jim Krupitzer. DANA REIMER/BOEING

PTT members not pictured: Derrick Mathews, Casey Steiner, Amy Poe, Cindy Wells, Christie Hill, Fariba Danesh, Clint Julien, Maegahn Steele, Ken Frigo, Ron Lewis, Don Carver, Liz Gill, Steve Sergenti, Doug Hedman, Dawn Crampton, Christine Reed, Phil Pearson, Brian Wibbenmeyer, Steve Pallardy, Stacy Etsinger, Annette LaMora, Jim Russell, Dean Ramert, Dan Judd, Jim Gregory, Todd Rowe, Errol Mitchell.



This ad was created to demonstrate Boeing's appreciation and gratitude for the U.S. Armed Forces. Part of an integrated effort, this print ad ran in The Washington Post *and* The Washington Times, *as well as in 76 regional, trade and military publications. The campaign also featured complementary TV and online components.*



This new Integrated Defense Systems print ad for the C-17 was developed to celebrate the United Kingdom's achievement of 50,000 flight hours and to use the occasion to salute the customer. The ad will run in select U.K. military trade publications.