



Frontiers

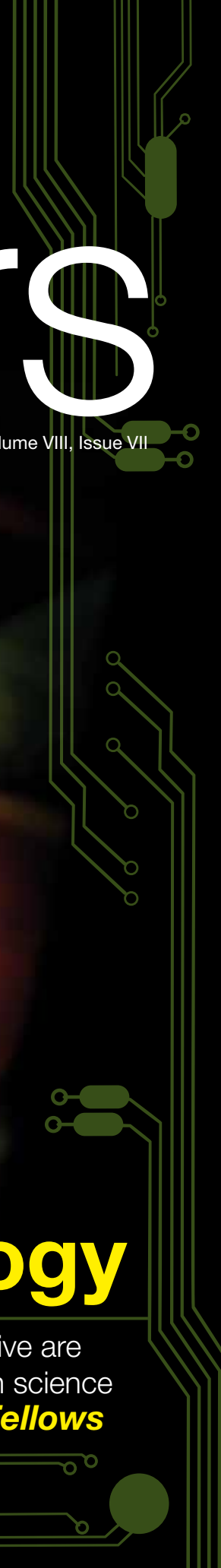
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NOVEMBER 2009 / Volume VIII, Issue VII



Pushing **technology**

Keeping Boeing competitive are some of the best minds in science and engineering: **Tech Fellows**





For all who served and all who serve.

Thank you.

 **BOEING**

This ad was created to demonstrate Boeing's appreciation and gratitude to U.S. veterans. Part of an integrated effort, this print ad will run in The Washington Post and The Washington Times, as well as in more than 70 regional, trade and military publications. The campaign will also feature TV and online components.

12

The problem solvers

Throughout its nearly 100 years, Boeing has been a leader in pushing the boundaries of flight and technology and driving innovation. Helping to build on this technological legacy, and keeping Boeing at the forefront as it competes in the global arena, are the 2,300 members of the Technical Fellowship. Boeing turns to them when there are tough problems to be solved.

COVER IMAGE: STEVEN GRIFFIN, ONE OF BOEING'S EXPERTS IN STRUCTURAL DYNAMICS, ACOUSTICS AND VIBRATION CONTROL, IS A TECHNICAL FELLOW WITH DIRECTED ENERGY SYSTEMS IN ALBUQUERQUE, N.M. HE HAS BEEN PART OF THE TEAM WORKING ON BOEING'S ADVANCED TACTICAL LASER, A MODIFIED C-130 AIRCRAFT WITH A HIGH-ENERGY CHEMICAL LASER AND A BEAM CONTROL SYSTEM. THE PHOTO SHOWS THE TURRET THAT AIMS AND TRANSMITS THE LASER BEAM TO THE TARGET. BOB FERGUSON/BOEING

PHOTO: DAVID BLANDING, A TECHNICAL FELLOW IN HUNTINGTON BEACH, CALIF., IS ONE OF BOEING'S EXPERTS ON REPLACING HYDRAULIC ACTUATORS WITH MORE EFFICIENT ELECTRIC VERSIONS. THE TECHNOLOGY IS BEING EVALUATED FOR USE IN CONTROLLING AN AIRCRAFT'S PRIMARY FLIGHT CONTROL SURFACES. MICHAEL GAIL/BOEING



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46 Why they serve

The Boeing Company honors the men and women who have served, and who continue to serve, in the military, defending freedom around the world. More than 27,500 veterans and reservists work for Boeing. Several shared their stories with *Frontiers*. PHOTO: BOB FERGUSON/BOEING

table of c



20

Shared vision

Located at the crossroads of Europe, Asia and Africa, the United Arab Emirates (UAE) is a major market for Boeing's commercial and military business. One of the country's main airlines, Emirates, is the world's largest 777 operator. But even as the aerospace industry gathers in Dubai for this month's air show, Boeing and the UAE are looking much further out — with a growing partnership that presents significant opportunities for both.

PHOTO: ETIHAD AIRWAYS



27

People first

Despite U.S. defense spending cutbacks, Integrated Defense Systems has a strong core business and is expanding not only internationally but also into cybersecurity, unmanned systems, energy solutions and a broad array of services, according to Dennis Muilenburg, IDS president and CEO. Muilenburg talked with *Frontiers* about the challenges and opportunities ahead for IDS, and about his "people first" strategy. PHOTO: BOB FERGUSON/BOEING



Contents

On course

Although its roots go back to 1934, Boeing subsidiary Jeppesen continues to push the envelope when it comes to charting the skies for pilots. Now in its 75th year, Jeppesen is also expanding its global business into rail and marine transportation. PHOTO: JEPPESEN

Long-range vision

Test ranges around the world, where planes drop real bombs and soldiers fire live ammunition, are critical to ensure weapon systems, equipment and warfighters are ready for tomorrow's missions. But many of these ranges have outdated technology, so Boeing is moving quickly to position itself in this new market by providing innovative solutions. PHOTO: U.S. ARMY



Sea duty

It is an imposing presence on the high seas, a U.S. Navy missile destroyer with a deadly arsenal of offensive and defensive weapons. But critical to its operations

is what can't be seen—the Boeing-designed Data Multiplex System, or DMS. This network controls the critical flow of data for shipboard systems including navigation, steering, combat systems, damage control and ship machinery. PHOTO: BOEING

Quest to be best

Boeing's aim is to be not only the world's best aerospace company but also the best integrated. As part of this, Boeing is combining the test and evaluation assets from Commercial Airplanes and Integrated Defense Systems into one team. The leader of this effort, former Boeing test pilot Dennis O'Donoghue, discusses the strategy behind the move and the benefits that will result—and about being "best in test." PHOTO: MARIAN LOCKHART/BOEING



INSIDE

- 06 Snapshot/Quotables
- 07 Why We're Here

- 08 New and Notable
- 10 Historical Perspective

- 53 Stock Charts
- 54 Milestones

- 57 Around Boeing



FLIGHT OF THE OSPREYS

An MV-22B Osprey from Marine Medium Tiltrotor Squadron 263, 22nd Marine Expeditionary Unit, prepares to land on the flight deck of the amphibious assault ship USS *Bataan*. Since May, the Bataan Amphibious Ready Group has been supporting Maritime Security Operations with the U.S. 5th Fleet in the Middle East. The Marine unit is the first ship-based deployment of the Osprey, a tiltrotor aircraft from Bell Boeing that can take off, hover and land like a helicopter or rotate its nacelles forward for high-speed, high-altitude horizontal flight like a fixed-wing, turboprop airplane. **U.S. MARINE CORPS**

Quotables

“We are very pleased with the results ... they compared well with our analytical predictions.”

– David Seidel, 747-8 Flutter testing lead, on the successful completion of 747-8 ground vibration testing. The vibrations simulate what the plane will experience in flight and is a key milestone leading up to first flight.

“When this capability is available to the warfighter it will help transform the battlefield.”

– Debra Rub, vice president of Weapons Programs at Boeing, talking to United Press International about successful tests of the high-precision, low-collateral damage GBU-40 Small Diameter Bomb II.

IAM PROMOTIONS

No promotions listed for periods ending Sept. 25 and Oct. 2, 9, 16 and 23.

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>

A Driving Force

For this Boeing driver, shuttling visitors and customers is about **more than quality service.**

By Bill Seil and photo by Marian Lockhart/Boeing

When customers arrive in Seattle to visit a Boeing facility, there's a fair chance they'll be greeted at the airport by Fred Hudson. Hudson, 59, is a member of Shared Services Group's Licensed Transportation that, among other things, transports special visitors to and from Seattle-Tacoma International Airport. They consider themselves Boeing ambassadors and are often the first point of contact between Boeing and visiting customer executives. In this *Frontiers* series, which profiles employees talking about their jobs and how what they do fits into Boeing's overall goals, Hudson describes what quality service means to him and the importance of providing it to each visitor.

I'm basically a people person, and this job brings me new experiences every day. It's really enjoyable to get up each morning and say, "I wonder who I'm going to meet today. I wonder what languages I'm going to hear."

In most cases, I drive a Chevrolet Suburban that will accommodate several people and their luggage. When I pick up larger groups I generally drive a van, similar in size to an airport shuttle.

All of our cars are equipped with a digital dispatch system, which is used by drivers and dispatchers to schedule and display data on individual assignments. Of course, we can also speak with our dispatcher by radio.

In most cases, I wear a red polo shirt to be easily spotted at the airport. But in special situations, I'll put on a white shirt, striped tie and blue blazer and transport my passengers in a stretch limousine or Lincoln Town Car.

My passengers have varied English language skills, but over the years I've developed some versatile communication skills. I try to build a general knowledge of international cultures to ensure that my passengers are comfortable.

We drivers know that we're doing an important job for the company. We want to be one of the reasons that customers choose Boeing.

In addition to driving customers, I'm often called on to shuttle company executives who are catching flights or on their way to local meetings. I'm also dispatched to greet private aircraft, including Boeing Business Jets at Boeing Field, and provide visitors with ground transportation.

I hired into Boeing in 1968 and joined Licensed Transportation 11 years later. In the mid-1990s, I began my current job driving passengers. Since then I've enhanced my driving skills. This has included training in handling situations where special security is needed.

Over the years, I've transported many executives and leaders, as well as some celebrities, including actor John Travolta.

It's fun meeting famous people, but to me, all of our customers are just as exciting and just as important. They all deserve a very high level of service. ■

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Glitch-free

Boeing continually improves software that is the 'central nervous system' of the International Space Station. By Ed Memi

Upgrading personal computers with new software often introduces glitches that we learn to accept and work through. On the International Space Station, however, software glitches are not an option. As they live and work some 220 miles (350 kilometers) above the Earth, astronauts entrust their lives to the software that keeps station systems functioning.

Software engineers at Boeing Space Exploration wrote, tested and recently updated the space station's Command and Control Software (CCS), which allows new spacecraft and modules to be attached to the station. The software update, with about 730,000 lines of code, was loaded in August and is the eighth major software update since 1998.

Serving as the brains of all the other space station software, the software is necessary for each mission to:

- Control the operation of the on-orbit vehicle portion of the station, as well as audio and video equipment.
- Manage data communication between the spacecraft and the ground, crew and external vehicles and the distribution of the data between functional areas of the ISS.
- Provide added capability for current and future vehicle dockings such as the Japanese H-II Transfer Vehicle, an unmanned supply spacecraft used for ferrying supplies to the ISS.

"All of the space station's interaction with mission control, ground facilities and other space station systems comes through our computers," said Cary Cheatham, Boeing manager of the CCS development team. "The system monitors any and all events that pose a safety issue for the space station. It automatically initiates valve closing and isolation maneuvers, and it monitors data

from all the other ISS computers to decide what actions to take."

Dale Kohn, Boeing hardware and software integration manager, said the update "has gone seamlessly. We have done it before with earlier versions, but this is the very first time that we have done an update with the international partner elements attached."

"It is always amazing to see a CCS software transition go so smoothly since the software must interface with both the U.S. and international elements," said Boeing CCS software implementation lead Joy Millican.

Boeing has a long-term schedule of updates for the CCS, which includes software release updates about every two years beginning in 2012. ■

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PHOTO: Command and Control System (CCS) software developer Jason Anderson sets up equipment for a software test at Johnson Space Center in Houston while Boeing CCS manager Cary Cheatham looks on. ELIZABETH MORRELL/BOEING

Software developers and operators train for each space station mission at NASA's International Space Station Software Development and Integration Laboratory in Houston, where engineers can test the software in an environment similar to that on orbit. In preparation for the recent software upload, Boeing software engineers created an identical system in the integration lab to mimic the configuration on orbit. Boeing had a team of experts in the lab and in NASA's Mission Evaluation Room on Sept. 10 to monitor the software when the Japanese H-II Transfer Vehicle docked to the space station for the first time.

Sunny today with record highs

Records are made to be broken—even at the cellular level. Spectrolab, a wholly owned Boeing subsidiary that has been producing solar cells for the space industry since 1956, recently announced that it has set a record for terrestrial concentrator solar cell efficiency.

The National Renewable Energy Lab in Golden, Colo., verified that an Earth-based solar cell by Spectrolab of Sylmar, Calif., converts 41.6 percent of concentrated sunlight into energy. The previous 41.1 percent record was held by Germany's Fraunhofer Institute.

Solar cells in concentrator systems are smaller and use a lens or mirror system to amplify sunlight, so fewer cells are required to produce the same electrical output as conventional solar cells. Though still a prototype, Spectrolab's cell could help energy producers generate more electrical power from typical industrial solar panels. And that would mean lower costs to homeowners and businesses.

— Dave Garlick



PHOTO: Wafer-processing technician German Rivera inspects a semiconductor wafer that will yield numerous solar cells used to generate power for telecommunications satellites and spacecraft such as the Spirit and Opportunity rovers currently exploring Mars. BOB FERGUSON/BOEING

Choose well

Annual enrollment for health and insurance benefits begins Nov. 10 for most Boeing employees and retirees. The company provides a variety of benefits, programs and resources designed to promote healthy lifestyles and help employees make informed decisions. This enrollment opportunity allows individuals to examine plan offerings and choose benefits that contribute to their well-being.

In most cases, current benefit elections will continue automatically into next year. But the costs of certain benefit features may be changing. "That, coupled with employees' own changing needs and goals," said Rick Stephens, senior vice president, Human Resources and Administration, "makes this a good time for employees to re-evaluate health and insurance plan choices and choose the plans that are right for them."

Benefits Updates and Enrollment packets have been mailed.

Employees wishing to make changes to existing benefits or enroll in a flexible spending account must do so by 11:59 p.m. Dec. 3. After that, benefit changes cannot be made until next year's enrollment period unless there is an event like marriage, establishment of a certified domestic partnership, or birth or adoption.

"Enrolling is just the first step in making smart choices about benefits," Stephens said. "It's as important to use those benefits wisely throughout the year to improve your health and well-being. In the end, that also helps control benefits costs for everyone."

— Ron Taylor



2009 FALL ENROLLMENT
Benefits Information



Time to
choose
well.

Alissa D. H.
12 years at Boeing
Exploring the world and
improving our customers' health through research,
including breast health screening research.

Enroll for 2010 health and insurance benefits November 10–December 3.

- ✓ **Review** the contents of your enrollment packet.
- ✓ **Explore** your Benefits Resources to help you make informed decisions.
- ✓ **Enroll** or make changes by the December 3, 2009, deadline.
- ✓ **Check** your confirmation statement.

Well Being
Choose well. Live well.

GRAPHIC: Individuals eligible for fall health benefits enrollment have been mailed enrollment guides like this. BOEING

A Boeing Legend

The primary trainer for U.S. pilots during World War II, hundreds of Stearman Kaydets are still flying today. By Mike Lombardi

What are the most popular and beloved Boeing and Boeing heritage planes of all time? That question might bring up images of the B-17, 707 and 747, or the Douglas DC-3 and DC-8, or the North American P-51 Mustang—but probably not that of a single-engine biplane. On the other hand, if you are one of the more than 1,000 proud owners of a Boeing/Stearman Model 73-76 Kaydet trainer, affectionately known as a “Stearman,” you would not be surprised.

The Stearman represents the largest production run of a Boeing heritage plane at a single site and also helped launch what would become the Boeing Wichita Division in Wichita, Kan.

Today, those operations continue as Boeing Integrated Defense Systems Wichita and Spirit AeroSystems, none of which would have been possible without the vision and perseverance of one Boeing leader—James “Earl” Schaefer.

The Kaydet trainer began as a product of the Stearman Aircraft Co., a wholly owned subsidiary and later a division of the Boeing Airplane Co. Named for its founder, Lloyd Stearman, the company was established in Venice, Calif., in 1927, and enjoyed some initial success building mail planes. Stearman was soon looking for additional capital to expand his company. A group of Wichita investors pledged \$60,000 and convinced Stearman to return to his Wichita home.

After establishing operations in Wichita, the company caught the interest of William Boeing, and in 1929 Stearman Aircraft was merged into Boeing’s aviation holding company, United Aircraft and Transportation Corp (UATC).

Not satisfied being a part of a large corporation, Stearman resigned from his company and UATC in 1931.

Even though the company would continue to carry the name of its founder, the man who saved the Stearman Co. and secured the future of the Boeing business in Wichita was Schaefer. He had started at Stearman Aircraft as vice president of sales and later replaced Stearman as general manager.

Taking over leadership of the company, Schaefer faced a crisis that required all of his skills as a leader and salesman to find a way to turn around UATC’s board of directors, who wanted to shutter the Wichita operations. Indeed, Schaefer set a course that would prove to be a huge success for Stearman Aircraft and later Boeing Wichita—building military trainers.

Under Schaefer’s leadership, a small team at Stearman, including chief engineer Mac Short and notable designers Howard Zipp and Jack Clark, set out to design a military trainer based on the earlier Stearman Model 6 and Boeing Model 203 biplane trainers. Within 60 days the team developed the



PHOTO: A U.S. Navy version, designated N2S-5, is shown in flight. BOEING ARCHIVES



For Stearman Aircraft, 1934 was a monumental year beginning with the first flight of the Model 70 and followed by a reorganization that made Stearman Aircraft a subsidiary of the Boeing Airplane Co.

PHOTOS: (LEFT) J. Earl Schaefer (left), who led a Boeing team that produced more than 10,000 Stearman Kaydet trainers, confers with Stearman founder Lloyd Stearman. **(ABOVE)** The last of more than 10,000 Kaydets, all built by Boeing. BOEING ARCHIVES

Model 70, a prototype for the Kaydet biplane trainer that eventually would be used for primary flight training by nearly every U.S. Army and Navy pilot during World War II.

For Stearman Aircraft, 1934 was a monumental year beginning with the first flight of the Model 70 and followed by the reorganization of UATC, which made Stearman Aircraft a subsidiary of the Boeing Airplane Co. But the big news of 1934 was the company winning its first government production contract, a U.S. Navy order for 61 Stearman Model 73 trainers. Designated NS-1 in Navy service, the first one flew on Nov. 26, 1934, and was delivered on Dec. 18.

The Army followed with an initial order for 36 Model 75 trainers designated the PT-13. It was the beginning of a highly successful program and by 1945 Boeing had built the equivalent of 10,346 Kaydets in all versions.

The last Kaydet built was an Army PT-13D model and it was delivered in a special ceremony on Feb. 16, 1945. When

the final Kaydet became surplus after the war, Boeing bought it back from the Army.

Schaefer not only delivered results with the Kaydet, but he also led the expansion of Boeing operations at Wichita, which allowed for the production of 1,644 B-29s and more than 1,300 B-47s. In June 1959, Schaefer announced his retirement after seeing the second B-52 production line established in Wichita. He was vice chairman of Boeing at the time. When Schaefer retired, Boeing also decided it was time to retire the last Kaydet, and it donated the plane to the National Museum of the U.S. Air Force in Dayton, Ohio, where it continues to be displayed today. The plane was flown to Dayton on June 24, 1959, by well-known Boeing test pilot George Hanna.

Fittingly, the passenger on that final flight was the man who had made Boeing Wichita and the Kaydet a success—Earl Schaefer. ■

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The go-to gang

The Technical Fellowship gives Boeing a marketplace advantage.

Here's how some of its many members have created value by tackling vexing challenges. All stories by **Cindy Naucler Glickert**

Boeing engineers have been pushing the boundaries of flight and defining the future of aerospace for almost a century. These engineers have overcome seemingly insurmountable technology challenges by teaming up and applying their combined knowledge, skills, experience and imagination to solve the problems at hand. Their achievements have given Boeing an unmatched technological legacy.

Boeing maintains this tremendous engineering capability by cultivating and recognizing top engineering talent in a number of ways—challenging assignments, high-potential programs, mentoring, special invention awards and more. One of its keystone programs is the Boeing Technical Fellowship.

The roughly 2,300 members of the Technical Fellowship represent some of the best engineering and scientific minds at Boeing and in the industry, and give the company a strategic advantage in today's fiercely competitive marketplace. By developing and supporting the technologies that make it possible for Boeing to offer its customers high-performance products and services at affordable costs, the Technical Fellows are ensuring the company remains competitive today and in the future.

"Members of the Technical Fellowship are the people we turn to when there's a particularly vexing problem to be solved," said Amy Buhrig, corporate sponsor of the Fellowship Program and Enterprise Technology Strategy director. "We count on the depth and breadth of their knowledge for everything from solving hard problems on existing programs to coming up with creative solutions for new business opportunities and helping develop our long-term technology strategy."

Established in 1989, the Technical Fellowship Program offers a technical career path for the company's engineering and scientific community. Recently, the Fellowship was revised to ensure that it is better aligned with Boeing's evolving business needs.

The Fellowship Program office and Senior Technical Fellowship Leadership Team have now tied members' work more closely to product requirements and streamlined the Fellowship selection process. These changes reflect guidance from Boeing Chief Technology Officer John Tracy, who solicited advice from senior management, Senior Technology Fellows and engineers across the company on how the Fellowship can operate more efficiently and effectively in meeting Boeing's needs.

"We moved to a management nomination process to reinforce discussions between a manager and employee, and to help assess when is the right time for a candidate to enter into the selection process," said Sue-Lynn Yim, Fellowship program

manager. "We also updated the qualification criteria to better focus on technical excellence, innovation and sustaining our technical knowledge across generations."

The selection criteria were distilled from nine items down to five. The simplification didn't change what the program is looking for in candidates, but rather clarified expectations. The criteria are:

- **Technical knowledge and judgment** – "It means having a company or industry level of influence over the direction of where a technology is headed," said Ken Hays, Fellowship chair and Senior Technical Fellow. "It's where the rubber meets the road for Boeing and really enables results."
- **Boeing impact through creative problem solving and innovation** – "This is about originality," said James Farricker, Fellowship deputy for Engineering, Operations & Technology and a Senior Technical Fellow. "In terms of inventions and patents, it addresses what scientific tools people have developed to increase productivity and our ability to service our products."
- **Technical leadership, advisory and consulting** – "This is where candidates get to show that they're an authority within their discipline," said Bill Seidler II, Fellowship deputy for Integrated Defense Systems and a Senior Technical Fellow.
- **Capability as a teacher and mentor** – This criterion ensures Boeing has the necessary technical skills for the future, said Dave Nakamura, Fellowship deputy for Commercial Airplanes and a Senior Technical Fellow. "A candidate should transfer knowledge to other employees through activities such as communities of practice, lectures, and seminars and classes, as well as providing career guidance."
- **Having technical vision** – This refers to how a candidate has helped steer the direction of a development effort and worked to get that vision infused into Boeing's planning processes.

New this fall is a pilot program called EDGE (Explore-Dream-Grow-Energize) that is intended to provide resources for Fellowship members to develop ideas outside their regular jobs. This pilot program, which began in September and will run through Dec. 15, will fund Fellowship members for up to a week to identify novel and innovative solutions providing value to Boeing and its customers.

"It's an opportunity for Tech Fellows to spend time brainstorming about challenges and opportunities that will keep Boeing innovation at the cutting edge of technology," Buhrig said.

In the next pages, meet some of the Technical Fellowship members who are demonstrating the technical knowledge, leadership and vision that make the Fellowship critical to Boeing's future. ■

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Mitigating threats

“We’re developing the tools that can sift through the data and find the key parts. And that saves lives by providing better information to warfighters.”

David Miazza is uniquely qualified to support Boeing military customers in the fight against terrorism.

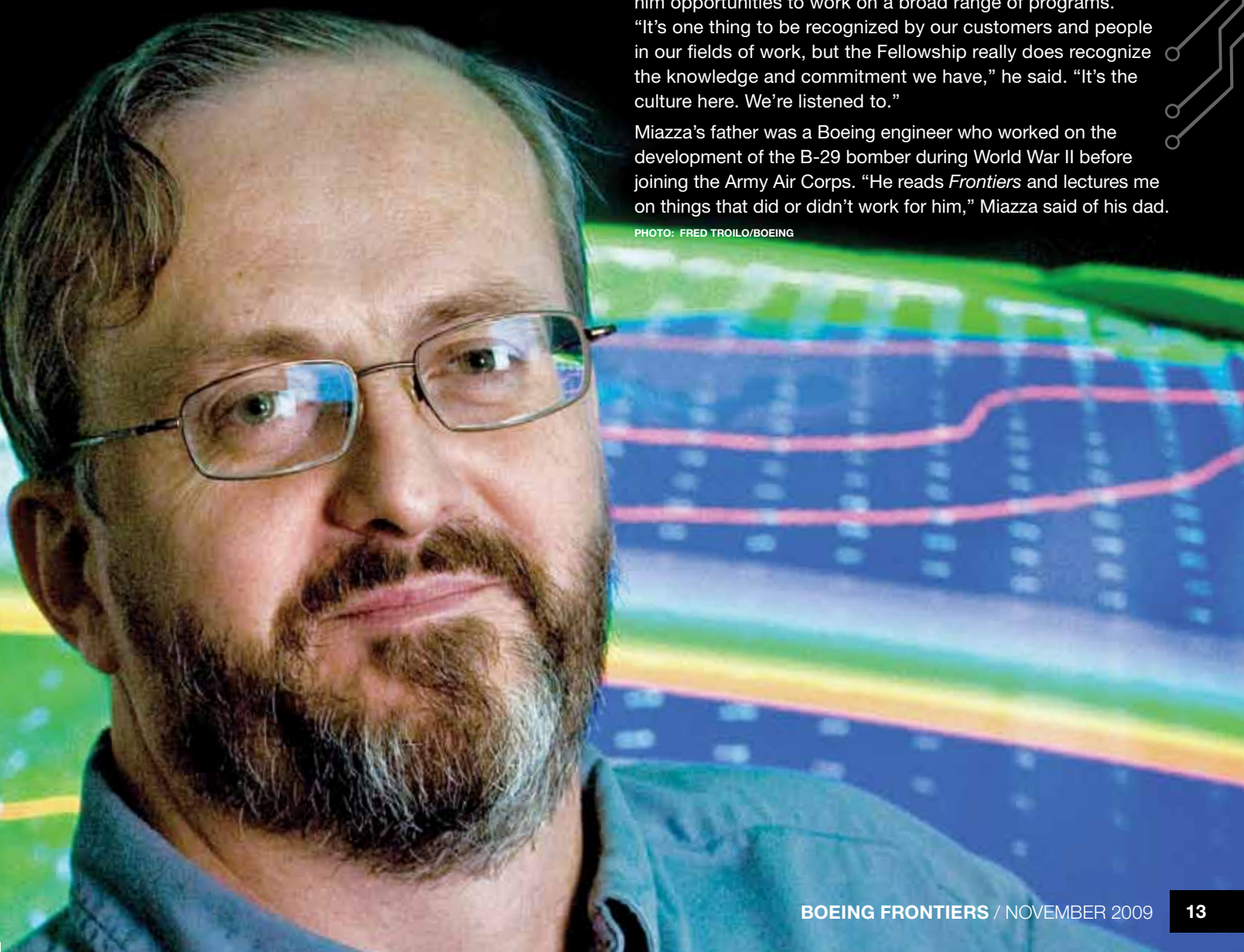
A Technical Fellow in Integrated Defense Systems’ Mission Systems unit in Springfield, Va., Miazza started as an electrical and an electro-optics engineer. Now he works more broadly in systems engineering, remote sensing and intelligence systems. The background of Miazza, who is sometimes labeled a “hybrid” engineer because of his knowledge in electronics, physics and optics, is a big plus for Mission Systems, which supports the U.S. Defense Department and the Intelligence Community.

“Terrorism happening on the other side of the world can impact us very quickly,” Miazza said. “There are more and more [data] sensors and faster processing, but you can be buried by the data they produce. We’re developing the tools that can sift through the data and find the key parts. And that saves lives by providing better information to warfighters.”

Miazza credits the Technical Fellowship Program for giving him opportunities to work on a broad range of programs. “It’s one thing to be recognized by our customers and people in our fields of work, but the Fellowship really does recognize the knowledge and commitment we have,” he said. “It’s the culture here. We’re listened to.”

Miazza’s father was a Boeing engineer who worked on the development of the B-29 bomber during World War II before joining the Army Air Corps. “He reads *Frontiers* and lectures me on things that did or didn’t work for him,” Miazza said of his dad.

PHOTO: FRED TROILO/BOEING



A mind field of information

Emily Howard is one of Boeing's leading experts in analyzing how people process information—critical in the design and development of software applications that support network-centric systems.

“Through a series of engineering-prototype experiments, we can objectively evaluate how well our products would enable military decision-makers to gather and disseminate information—and adjust our development efforts as a result,” said Howard, a Huntington Beach, Calif.-based Senior Technical Fellow with a doctorate in psychology. “The ability to process volumes of information quickly can mean life or death on a battlefield.”

Some colleagues haven't always understood the benefit of using psychology to study how people learn and make decisions and then applying that knowledge to engineer better products.

“That's where the Fellowship has really helped me,” said Howard, who's with the Advanced Command, Control and Communications (or C3) Networks team of Phantom Works, the Integrated Defense Systems organization that works on advanced concepts and technologies. “It's given me the opportunities to illustrate the business value, in both growth and productivity, for understanding human information processing and its effect on our products.”

One of her recent achievements was adapting the Future Combat Systems program's user interface to create a Joint Warfighter-Machine Interface framework supporting numerous applications. Her next challenge? “I'd like to apply my skills internationally, to address how information technology can be applied to support cultural differences in decision-making, and open new markets for Boeing.”

PHOTO: MICHAEL GAIL/BOEING

“The ability to process volumes of information quickly can mean life or death on a battlefield.”





Electric moves

“Being part of the Technical Fellowship Program has enabled me to conduct advanced research with universities across the globe.”

David Blanding keeps motoring on, helping push the technology on Boeing aircraft to new frontiers. A Boeing Research & Technology Technical Fellow in Huntington Beach, Calif., Blanding has been instrumental in developing sophisticated electric actuators for military, space and commercial aircraft.

“The electric actuator is not only improving aircraft performance and reducing weight—it’s cutting maintenance costs,” Blanding said. “Now we’re moving toward putting this technology on critical primary flight control surfaces.”

Blanding is one of Boeing’s resident experts on replacing hydraulic actuators with more efficient electric versions. “Electric actuators have been used for years on secondary flight control and utility systems for military aircraft, spacecraft and commercial airplanes,” he said. “What’s new is, we’re evaluating the technology for use in controlling an aircraft’s primary flight control surfaces, which include the aileron, the spoilers, the elevators and the rudder.”

Blanding, who holds a master’s degree in technology management, said he has a strong working relationship with teams from Integrated Defense Systems. But he credited the Technical Fellowship Program for helping him share—and add to—his knowledge of electric actuators by working with people beyond IDS.

“Being a Tech Fellow has enabled me to build a really rewarding partnership with engineers in Commercial Airplanes,” he said. “The program enables you to meet the right people who need your technical expertise. And being part of the Technical Fellowship Program has enabled me to conduct advanced research with universities across the globe.”

Blanding’s engineering activities extend beyond Boeing and into the Huntington Beach community. “I’m especially focused on helping young African Americans go to college and major in the sciences,” he said. “Helping young people to go beyond where I am is more important than helping them get to where I am.”

PHOTO: MICHAEL GAIL/BOEING

Fueling a need

As a young man, Mark Kay paid for his degree in mechanical engineering by working evenings at a gas station. Today, he's still working with fuel—only now it's at the cutting edge of biofuel technology.

"Boeing isn't in the business of making fuel, but our products use it," said Kay, a St. Louis-based Associate Technical Fellow with the Platform Systems Technology team of Boeing Research & Technology. "That's why it's our job to work with oil companies and small biotech companies to help steer the development of biofuels. That and the fact that it's the environmentally responsible thing to do."

Platform Systems Technology collaborates with suppliers and technology providers to produce leading-edge solutions for military and commercial programs. One of its biggest areas of interest is biofuels.

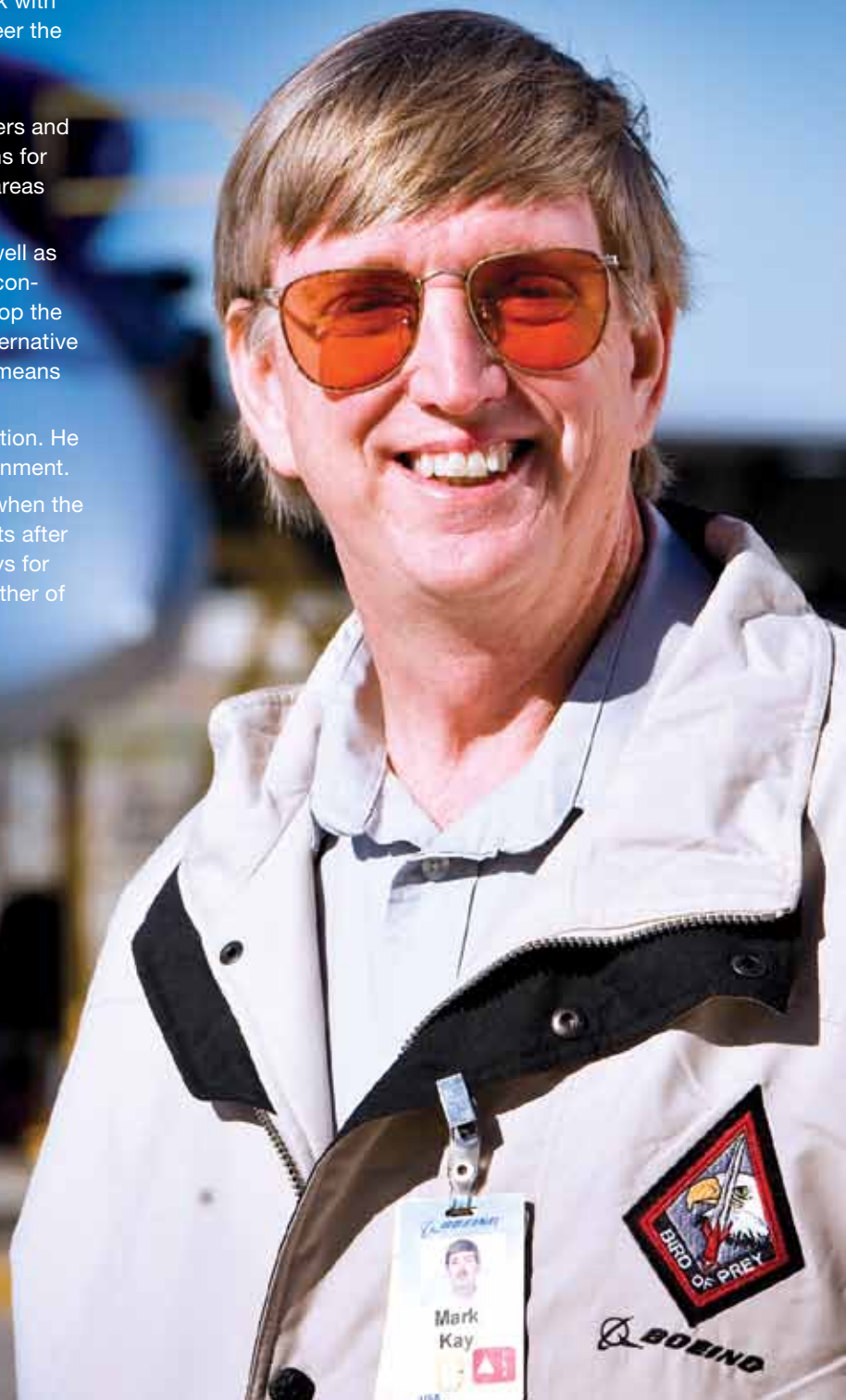
"We work with commercial industry organizations, as well as organizations within the U.S. Air Force and Navy, that control fuel specifications," Kay explained. "We help develop the specifications that will enable planes to handle new alternative fuels. They need to be a 'drop-in replacement,' which means they need to perform as well as the petroleum fuels."


Kay's connection with fuel started early, at that gas station. He also had an early appreciation for protecting the environment.

"As a kid growing up in St. Louis, I remember winters when the snow would start to turn black from the coal-fired plants after a couple days," he said, adding: "Now when snow stays for a week it remains white. That's important to me as a father of four—and a guy with a bass boat."

PHOTO: RON BOOKOUT/BOEING

"It's our job to work with oil companies and small biotech companies to help steer the development of biofuels."





Engineering at the speed of light

“I’m able to get involved with not only building prototypes but also seeing them through to the design and test stages.”

This summer, when the Advanced Tactical Laser, or ATL, aircraft first hit a ground-based target while in flight, Steven Griffin, an Integrated Defense Systems Technical Fellow in Albuquerque, N.M., had reason to be proud.

Griffin works vibration control issues for the modified C-130H aircraft, which carries a high-energy chemical laser and beam control system designed to destroy, damage or disable targets with little or no collateral damage. He remembers being called in about three years ago when there was a critical vibration problem with the laser’s primary mirror.

“We had 10 days to test the hardware, analyze it, design a vibration device to resolve the problem and then integrate it,” he said. “It was one of the highlights of my career.”

Griffin, who has a doctorate in aerospace engineering, is one of the company’s experts in structural dynamics, acoustics and vibration control for Directed Energy Systems. “My work can change from tackling a vibration problem in Albuquerque one week to working an acoustics problem in Seattle the next,” he said. “It’s a good fit because I’m able to get involved with not only building prototypes but also seeing them through to the design and test stages.”

Before coming to Boeing, Griffin worked as a military officer and then a civil servant. “The fact that Boeing maintains a technical career path through the Technical Fellowship Program is a real attraction to me,” he said. “Lots of aerospace companies advertise dual career paths, but at Boeing I’ve seen it in action and it’s a true path I can take to continue to advance.”

PHOTO: BOB FERGUSON/BOEING

One up

On the 787's final assembly line you'll hear about the One Up Assembly process, developed by a team under the leadership of Associate Technical Fellow Tanni Sisco. This process enables the drilling and fastening of 787 hybrid joints without having to disassemble parts for cleaning or deburring.

"The technology was imperative for the 787's breakthrough design, manufacturing and cycle-time goals," explained Sisco, of Commercial Airplanes in Everett, Wash.

The assembly process was developed by working with the Intellectual Property Management team and engineering communities across the enterprise. The payoff: It helps reduce airplane assembly time while increasing Boeing's competitive edge in manufacturing assembly processes.

Finding out-of-the-box solutions for problems is nothing new to Sisco. As a teenager, she and her sisters had to leave their homeland of Iran following that nation's revolution in the late 1970s. Her father, a military officer, was imprisoned for political reasons. When she arrived in the United States at age 19, Sisco worked full time while attending the University of Idaho, where she earned her bachelor's degree in mechanical engineering.

"I really think my best asset is my tenacity," she said. "I don't give up and I work hard."

Before supporting the 787 program, Sisco worked as a 777 shop manager where she experienced the challenge of building airplanes and "making the [production] rate." She enjoyed the opportunities that a managerial job brings, but credits the Technical Fellowship Program for helping her move to her current technical role.

"The Technical Fellowship Program has provided me with more opportunities to learn about the technical and business side of airplane manufacturing," Sisco said.

PHOTO: GAIL HANUSA/BOEING

"The technology was imperative for the 787's breakthrough design, manufacturing and cycle-time goals."



Connecting worlds

“It has really enabled me to share a lot of my network and wireless activities across the enterprise to make sure we’re all focused on the right priorities.”

What keeps Sudhakar Shetty busy? Exactly the kind of thing you’d expect from a Senior Technical Fellow. “I am working on technologies to ensure that our airline customers, suppliers and Boeing can connect to our airplanes at any time, from anywhere around the globe—to build, operate and maintain them safely and efficiently,” said Shetty, a Senior Technical Fellow with Commercial Airplanes’ Airplane Systems team in Everett, Wash., who holds a doctorate in electrical engineering.

Shetty has worked with airlines and suppliers worldwide to develop industry standards for onboard network and wireless systems. He leads Commercial Airplanes’ work in network and wireless systems research strategies and technologies. And he supports the Networked Systems Technology Domain, one of eight companywide technology groupings in Boeing’s Enterprise Technology Strategy that is designed to better integrate and focus Boeing’s technology investments. In this group, he is aligning Commercial Airplanes’ strategies with those of Boeing Research & Technology and Integrated Defense Systems.

Shetty credits the Technical Fellowship Program for helping him gain additional career experiences and opportunities. “It has really enabled me to share a lot of my network and wireless activities across the enterprise to make sure we’re all focused on the right priorities,” he said.

A native of India, Shetty serves on the board of directors of the Indo-American Friendship Forum, a nonprofit group that focuses on educational and trade activities between the United States and India and within the Indo-American Community. In 2008, he helped establish an aerospace network research consortium in India.

PHOTO: GAIL HANUSA/BOEING



الأمارات

Bright prospects

The partnership between the United Arab Emirates and Boeing offers significant opportunities for both. **By Bill Seil**

United Arab Emirates at a glance

Location: Middle East, bordering the Arabian Gulf, the Gulf of Oman, the Arabian Sea, Oman, Saudi Arabia and Qatar

Area: 32,278 square miles (83,600 square kilometers)

Estimated population, 2009: 4.8 million

Major cities: Abu Dhabi (capital), Dubai

Gross domestic product, 2008: \$184.3 billion (U.S.), ranked 56th in the world

GDP growth rate, 2008: 7.4 percent

Main export partners: Japan, South Korea, Thailand, India

Source: CIA World Factbook

The United Arab Emirates (UAE), a nation of 5 million people on the eastern border of Saudi Arabia, has experienced rapid modernization since its founding in 1971. While abundant oil reserves fueled its recent development, the country is pursuing a visionary diversification strategy that includes aerospace manufacturing and growth as a commercial aviation hub.

The UAE is a major market for Boeing's commercial and military products and services. Boeing also has much to offer the UAE, and business opportunities are expected to grow as the company helps the UAE realize its economic development plans.

Paul Kinscherff, president, Boeing Middle East, and based in Dubai, noted the country is geographically at the crossroads of Europe, Asia and Africa.

"If you look at a map and draw a circle around the UAE, it's clear how strategically located it is," Kinscherff said. "As a consequence, with strong leadership and effective policies, the UAE has emerged as a key global transit hub and a leading player in regional affairs. Its prospects are bright, and Boeing is exceptionally well positioned to support the UAE's growth and diversification strategy."

Demand in the UAE for commercial airplanes remains high. The nation's two largest airlines, Emirates Airlines and Etihad Airways, are respectively based in the fast-growing cities of Dubai and Abu Dhabi, the UAE's capital. Both airlines are increasing their long-range twin-aisle fleets as they expand to new destinations around the globe.

Low-cost startup flydubai, based in Dubai, launched its fleet in 2008 with an order for 50 Next-Generation 737s. The airline was created to provide regional service in and out of Dubai, where passengers can transfer to long-range flights.

GRAPHIC: The Arabic script that runs across this collection of stories means "Boeing in UAE."
PHOTO: All lined up and everywhere to go: Boeing 777s predominate in this nighttime shot at Dubai International Airport. Emirates is the world's largest 777 operator. EMIRATES AIRLINES

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“The UAE’s vision, wealth and location make it a very important commercial and military market for Boeing.” – Shep Hill, president, Boeing International

The UAE has a strong relationship with the United States, including important military ties. Boeing Integrated Defense Systems opened its office in Abu Dhabi in 1999 and provides military products to the UAE armed forces. Its first sales contract was for AH-64 Apache helicopters in the 1990s. In February, the UAE announced its intent to acquire four C-17 military transport aircraft. The UAE government is also considering the 737 Airborne Early Warning and Control aircraft, as well as a number of other products and sustainment capabilities.

The importance of the UAE as an aerospace player in the Middle East and around the world is underscored by this month’s Dubai Air Show, which many aerospace professionals regard as a “must attend” event.

While UAE leaders have dramatically grown the UAE economy in a short period of time, they are intensively pursuing opportunities to further reduce petroleum as a percent of gross domestic product to well under 50 percent. In aerospace and related technology, diversification efforts are being driven by a number of organizations that have achieved global recognition, including the Mubadala Development Co., Dubai Aerospace Enterprises, Thuraya Satellite Telecommunications Co., Emirates Advanced Investments and the Masdar Institute of Science and Technology, to name just a few.

“The UAE is small in population but large in vision and potential,” said Shep Hill, president, Boeing International.

“Its leadership is focused and has an ambitious strategy for the future. The UAE’s vision, wealth and location make it a very important commercial and military market for The Boeing Company.”

Hill and Kinscherff emphasize that Boeing’s ultimate success in the UAE will depend on its commitment to helping the country achieve its goals. Growing nations are more inclined to buy products from corporations that act as friends and partners, and who have a significant local presence.

While Boeing faces strong competition from Europe-based Airbus and its parent, EADS, the company has an aggressive strategy for contributing to the UAE’s success. Boeing is looking to strengthen business alliances within the country and is exploring opportunities to help the UAE develop capabilities as a regional aerospace provider, Hill said.

For example, Boeing could support the UAE as it develops research and development facilities. The oil-rich country is well-positioned to develop expertise in the creation of new composite materials.

The UAE is also interested in developing the skills and expertise of its people. While many of its professionals were educated in other countries, the UAE is working to expand its own system of higher education. It is also seeking Boeing’s help in strengthening business leadership throughout the nation.

“We have a multifaceted strategy in the UAE that goes well





A nation on the move

The United Arab Emirates (UAE) consists of seven “emirates,” which operate under a federal government system. The president of the UAE is Sheikh Khalifa bin Zayed Al Nayhan, who is also the ruler of the emirate of Abu Dhabi, the nation’s capital. The vice president and prime minister is Sheikh Mohammed bin Rashid Al Maktoum, who is also the ruler of the emirate of Dubai.

The UAE government is continuously innovating and evolving new methods of simplifying its business environment. The World Bank recently ranked the UAE 14th in its index measuring countries’ achievements in regulatory reform. The population of the country consists of many nationalities. While Islam is the UAE’s state religion, the government follows a policy of tolerance to other religions and cultures.

The nation has a growing tourism industry with numerous resorts, attractions and sporting events that draw visitors from around the world.

beyond export sales,” Kinscherff said. “In addition to providing the right products and outstanding services to our customers, Boeing is actively working to help the UAE expand aerospace and human development through broad industrial engagement and good corporate citizenship.”

Kinscherff said the company’s outreach includes government ministries, economic development agencies, universities, educational institutions and social service providers.

In 2004, Boeing and the UAE Higher Colleges of Technology signed a memorandum of understanding to collaborate on leadership development. Separately, Boeing supports the Emirates Environmental Group’s “Environment Across the Curriculum” program, which provides workshops to 200 teachers in environmental education. In addition, Boeing funds Junior Achievement programs in the UAE and across the region, and is additionally supporting the establishment of education Resource and Development Centers in which a “Start Early” program assists UAE parents, teachers and caregivers to maximize the potential of young children.

Jeff Johnson, IDS director of business development for the Middle East and Africa, said Boeing in recent years has increased its share of defense sales to the country. This has been made possible by building strong enterprisewide relationships with the UAE leaders, offering products and services that meet UAE requirements, and making a commitment to partnering with the UAE’s investment holding groups.

“Our level of commitment to the Emirati economy is significant and continues to expand,” Johnson said. “The UAE is making an investment in its people’s future and it wants to know that its industrial partners play a major role in that effort.”


Juma al Dhaheri, IDS business development lead in Abu Dhabi, has played a key role in raising the IDS profile in the country. A UAE national, Al Dhaheri is a former armed forces helicopter pilot and military attaché. He said customers in the UAE generally think of Boeing as one company rather than separating the military and commercial operations.

With one of the world’s most modern and well-equipped armed forces, the UAE is expanding its defense capabilities, Johnson said. This could be based on Vigilare integrated air battle management capability, which Boeing debuted earlier this year at the International Defense Exhibition and Conference in Abu Dhabi.

PHOTO ILLUSTRATION: An Etihad Airways 777-300ER (Extended Range) flies over the Abu Dhabi skyline. Abu Dhabi is the country’s capital and Etihad’s home base.

BRANDON LUONG/BOEING; AIRPLANE PHOTO: ED TURNER/BOEING, SKYLINE PHOTO: SHUTTERSTOCK.COM





“The UAE is making an investment in its people’s future and wants to know that its industrial partners play a major role in that effort.”

– Jeff Johnson, Integrated Defense Systems director of business development for the Middle East and Africa

The UAE is Boeing Commercial Airplanes’ largest customer in the Middle East—a region that is expected to need more than 1,700 new airplanes over the next 20 years. Marty Bentrott, Commercial Airplanes vice president of sales for the Middle East, Central Asia and India, said the worldwide economic downturn has affected the Middle East, but not to the same degree as other areas of the globe.

“The UAE is the largest long-term market opportunity for us within the region,” Bentrott said. “Emirates and Etihad are going to continue to grow and be competitive on a worldwide basis. I think you’ll find that with their strategy and level of service, they’ll be challenging a lot of the large legacy airlines on a global basis.”

The nation’s ambitions to partner in the development of commercial airplanes manufacturing and services creates an excellent opportunity for Boeing, Bentrott said. He envisions a day when UAE industries could supply, for example, composite parts for next-generation airplanes.

Freighters are another market opportunity. Both Emirates and Dubai Aerospace Enterprise Capital have ordered the 747-8 Freighter.

“In the low-cost-carrier arena, flydubai is a real success story for us because of its decision to go with 737-800s and, possibly, 737-900ERs [Extended Range],” Bentrott said. “This was a significant order for us, not just in terms of flydubai and the UAE, but the potential it symbolizes in the region.”

In addition to the airline market, Boeing Business Jets has a long-standing presence in the Middle East.

“The United Arab Emirates has been, and continues to be, one of the most important markets for Boeing’s business jet product line,” said Steve Taylor, president of the Boeing Business Jets program. “Its potential has grown as the market has expanded to include our twin-aisle products.”

Taylor said Boeing Business Jets has the right product mix for the Middle East market. This extends from the range capability of its large single-aisle BBJs to VIP versions of the twin-aisle 767, 777, 787 and 747-8 Intercontinental.

Dubai is also home to a large Boeing Commercial Airplanes spares distribution facility, one of eight worldwide, as well as a recently opened Aviall customer service center.

The Boeing work force in the UAE includes representatives from numerous Boeing organizations. Boeing employment in the UAE, currently around 50 people, is expected to grow as the company’s business activity increases.

Reflecting the diversity of the UAE, Boeing employs people from many nationalities in the Middle East, south Asia, Europe and Africa—15 at last count. Only a small number are U.S. citizens. While English is the primary language for business, it is not uncommon to hear other languages, particularly Arabic and Hindi, exchanged between co-workers.

“We have a truly diverse multinational work force,” Kinscherff said. “It’s exciting, energizing and always fun. We’re always learning from one another, and we always get great ideas and new perspectives. It highlights the potential of ‘One Boeing’ as a truly global company.” ■

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Aero-dynamic wing leader

Since 1977, the United Arab Emirates (UAE) has ordered 291 commercial jets from Boeing. This includes an order for 100 planes placed during the 2007 Dubai Air Show by Dubai Aerospace Enterprise Capital, a lessor that deals in both passenger and freighter aircraft. The major airlines of the UAE are:

- **Emirates** – now the largest operator of Boeing's 777 and the only airline to fly every 777 model
- **Etihad** – has ordered 787s and 777s valued at nearly \$10 billion
- **flydubai** – low-cost startup that launched operations with order for 50 Next-Generation 737s; it will be the first airline to receive the new 737 Boeing Sky Interior

The UAE is also a major Integrated Defense Systems customer.



Boeing services, subsidiaries have strong presence in UAE

Boeing subsidiaries and support personnel have a strong and growing presence in the United Arab Emirates (UAE), offering rapid around-the-clock support to commercial and military customers.

“Boeing is well-positioned to ensure our UAE customers get the products and services they need, when they need them,” said Paul Kinscherff, president, Boeing Middle East. “Jeppesen,

Aviall and Boeing Training & Flight Services are committed to this market and have excellent local representation.”

Jeppesen established a regional office in Dubai in 2007. The Boeing subsidiary provides information and information-management tools that support navigation and operations in the air, on water and over land. The office is staffed by a team with years of Middle East experience.

Another Boeing subsidiary, Aviall, opened a customer service center in Dubai in June. Aviall is one of the world’s largest providers of new aviation parts and related aftermarket operations. Located in the Dubai Airport free zone, it provides sales and customer service support, and stocks parts for the commercial airline industry, military customers and business aviation in the Middle East.

Boeing Training & Flight Services, formerly Alteon, placed a sales director in Dubai in 2009. Its global network supports customer needs with a variety of solutions, including 787 Dreamliner training.

A network of five Commercial Airplanes Field Service offices based in the Middle East provides customers quick access to expert airline support personnel. In addition, a Boeing Service Center in Dubai is one of the company’s eight spares distribution facilities worldwide. The Dubai center has an inventory of more than 26,000 items that can quickly be shipped to airline customers throughout the region.



“Boeing is well-positioned to ensure our UAE customers get the products and services they need, when they need them.” – Paul Kinscherff, president, Boeing Middle East

PHOTO: An Emirates Airlines 777 performs a flyby at the 2007 Dubai Air Show in tight formation with the British Royal Air Force Red Arrows aerobatic team. DUBAI AIR SHOW

Boeing Capital promotes aircraft investment opportunities to region's financiers

Along with having the Middle East's largest customer base for Boeing jetliners, the United Arab Emirates (UAE) is establishing itself as one of the world's major financial centers. Dubai, the UAE's most-populous city, now is home for many of the region's largest banks and financial institutions. It also is the region's most frequent site for investor-focused outreach events of Boeing's aircraft-financing unit, Boeing Capital Corporation, which has hosted its annual Middle East financiers and investors conference in Dubai four out of the last five years. This year's session in early October attracted more than 80 participants, more than twice the size of the first regional conference.

Increasingly, Boeing Capital executives are in the region to help increase its financiers' appetites for investing in aircraft, as opposed to other assets, thus generating capital to enable airline customer deliveries, said John Matthews, managing director for the Middle East and Africa. Boeing Capital connects with bankers and financiers in roundtable meetings frequently hosted by Matthews.

"A number of the UAE's banks are active in the aircraft-financing sector, with several of them, including some Islamic financing institutions, looking to become even more significant players," Matthews said. "The banks have tended to focus on Gulf airlines with which they are most familiar, but we continue to work with them to become more comfortable doing business outside the region and more international in their focus."

The UAE is also home to several large aircraft-leasing companies—namely DAE Capital, a branch of Dubai Aerospace Enterprise, and Abu Dhabi-based Waha Leasing—that appear to be expanding their expertise and aircraft investment portfolios.

Not surprisingly, the region's oil wealth has given birth to some of the world's largest sovereign wealth funds, among them the Abu Dhabi Investment Authority. Through these sovereign funds, nations invest surplus proceeds in state-owned funds that invest in such things as precious metals or stocks and bonds.

"We hope to encourage the UAE's sovereign wealth funds to increase their investments in aircraft financing because of the great investment nature of commercial airplanes as long-lived, stable and very mobile assets," Matthews said.

That asset-based nature also makes airplanes attractive to investors who provide Islamic financing, where terms and conditions are mandated by Islamic law. A fundamental criterion is that investments are asset-based.

"There are companies in the UAE that have done some innovative deals where they have securitized assets like real estate and broken them into tranches, or a series of securities with different investment risk levels, that are offered to investors," Matthews said. "We are optimistic that this financing product can be applied with airplanes as the asset as well."

— John Kvasnosky

"We hope to encourage the UAE's sovereign wealth funds to increase their investments in aircraft financing because of the great investment nature of commercial airplanes as long-lived, stable and very mobile assets."

— John Matthews, Boeing Capital, managing director for the Middle East and Africa

PHOTO: The landmark Gate Building is at the heart of the Dubai International Financial Center, which is attracting financial firms from around the world. SHUTTERSTOCK.COM

Core strength

Building on a strong portfolio of defense programs, Integrated Defense Systems **sets sights** on new markets and opportunities

Dennis Muilenburg, president and chief executive of Boeing Integrated Defense Systems, spoke with *Frontiers* about his vision for IDS, the challenges and opportunities ahead, and his “people first” leadership style.

PHOTO: BOB FERGUSON/BOEING

This is a challenging time for the defense business. How is Boeing doing in light of defense spending cutbacks in the United States?

The defense slowdown is not a surprise to us. We’ve anticipated it for some time. That’s why we’ve taken aggressive steps to increase productivity and reduce costs. We also believe U.S. defense budgets will be relatively flat for the next few years. So, to continue to grow and produce results for our stakeholders, IDS is repositioning into new markets, expanding internationally, and moving into adjacencies. We have strong core businesses and products such as C-17, F/A-18, integrated logistics, missile defense, networks, P-8 and rotorcraft. There’s also space programs, training, VC-25 and Wideband Global SATCOM, all of which benefit our customers and warfighters now and in the future. We’re also expanding into adjacencies like C4ISR [Command, Control, Communications, Computers, Intelligence,

Surveillance and Reconnaissance], cybersecurity, intelligence, energy solutions, unmanned systems, and a broad array of services like logistics command and control.

Where do you see IDS 10 years out?

A key growth driver will be international business. Ten years out we’re going to have a much broader international portfolio. We have great opportunities in places like Brazil, Denmark, India and United Arab Emirates. In regions where we’ve been successful—such as Australia, the United Kingdom and Saudi Arabia—we’ll leverage our in-country presence. There are international opportunities for fighters, rotorcraft, network systems, Airborne Early Warning and Control aircraft, training, performance-based logistics and the C-17. Five to 10 years out, we will also have a significant presence in the unmanned, intelligence, cybersecurity, C4ISR, energy and government services markets. Overall, it is our objective to be the best in the combined markets we serve.



“We’re all **very focused on flawless execution** of the business and **satisfying our customers**. We all want to **reduce costs and increase productivity**. We want to **grow into new markets**. All of those objectives are enabled by a **people-first strategy**.”

Potential Pentagon cutbacks on the C-17 and F/A-18 have been in the news lately. What are we doing to protect these core programs?

We’re not conceding either program. We have strong support from our local labor leaders and elected officials. Boeing and its supplier partners have been making a good case for continued support on Capitol Hill, with success. In August, U.S. Sen. Kit Bond and 17 other lawmakers called for the funding of 12 additional C-17s in the 2010 defense appropriations bill, with the full Senate approving 10 in early October. In June, President Obama signed the 2009 Supplemental Defense Spending bill, which includes funding for an additional eight C-17s. I also want to thank the thousands of employees who used the c17foramerica.com Web site to ask Congress for support. They really made a difference. The C-17 provides great support for our troops and we’ll continue to work toward protecting this core business, including marketing it internationally. The C-17 continues to play a critical role in providing humanitarian and disaster relief wherever needed, as several C-17s did in American Samoa and Indonesia in September.

For the F/A-18 Super Hornet, we’ll increasingly focus on international sales of the aircraft in countries like Brazil, Denmark and India. The Super Hornet is the Navy’s front-line strike fighter today, providing crucial capability for our troops in Afghanistan. Nearly half of all tactical aviation sorties in Afghanistan are flown by a Hornet or Super Hornet from the deck of

an aircraft carrier. Congress understands the capability the Super Hornet delivers and that the U.S. continues to face a shortage of these key combat aircraft. Language in the 2010 National Defense Authorization Bill increases fiscal year 2010 F/A-18E/F and EA-18G procurement from 31 to 40 aircraft. It also includes authorization for the U.S. Navy to enter into a new multiyear procurement (MYP). A new MYP would produce significant savings and ensure U.S. servicemen and -women in the future have the proven combat capability the Super Hornet delivers.

What’s the latest on the KC-X tanker competition?

Our KC-7A7 proposal team—made up of top-flight talent from both IDS and Commercial Airplanes and across all functions—has reviewed details of the draft Request for Proposal (RFP). We’ve submitted questions for clarification to the U.S. Air Force in advance of the final RFP and we’re now determining the details of our offering to meet our customer’s requirements. I’m confident that we will offer a combat-ready tanker with maximum capability at lowest cost, and prevail. Boeing has been meeting the Air Force’s aerial refueling needs for decades, and I know that together we can win this “franchise” program and ensure we’re building and supporting an American tanker fleet for decades to come.

What’s Boeing’s future in unmanned airborne systems (UAS)?

Unmanned aircraft systems like ScanEagle and innovative business models



■ KC-7A7 TANKER

such as ISR Services are helping Boeing expand in one of the fastest-growing markets in aerospace. We've created a new Unmanned Airborne Systems Division to lead our pursuit of this emerging market, which is wide open with no company yet occupying a dominant position. We're moving aggressively toward establishing Boeing as a major player. This includes investments in High Altitude Long Endurance, the A-160 and other new capabilities. It is our intent to be No. 1 in the UAS market in the long term.

What's Boeing's role in energy?

Earlier this year, we launched IDS Energy Solutions to focus growth into the energy market, including pursuits such as Smart Grid, [a plan to modernize the U.S. electric grid]. The Obama administration has identified Smart Grid as an urgent national priority requiring all levels of government as well as industry to cooperate. Boeing has already identified energy assurance and Smart Grid as logical business adjacencies we should pursue in our expanding services business. We're looking at how we can improve the national power infrastructure by bringing intelligence and security to the grid. We're also looking for ways to apply networking technology we've developed and apply it to the energy side of the business. In addition to three proposals recently submitted to the U.S. Energy Department, we've embedded Smart Grid technologies into facilities at multiple Boeing sites to reduce energy consumption and costs. We are also offering capabilities to reduce energy

and fuel-consumption costs for several government customers, and leveraging targeted renewable energy technologies such as biofuels.

You led the \$8 billion Global Services & Support business since early 2008. How important is GS&S to Boeing's growth?

GS&S is a high-growth business for Boeing, providing global after-delivery support for military platforms and systems and a broad array of government services. GS&S has generated year-to-date sales growth of about 15 to 20 percent compared with this time last year. It continues to be one of the real growth engines in IDS.

You also led Future Combat Systems. What are your thoughts on the change in direction for that program, now called Brigade Combat Team Modernization?

With the Defense Department's budget constraints, the resources were no longer there to carry out the original plan. The decision to terminate the Manned Ground Vehicle component of the program was disappointing. However, the commitment to accelerate and expand the network and other systems to all Army Brigade Combat Teams is encouraging and reflects our customer's confidence in the technological maturity of capabilities already developed, as well as the progress the team has made to date. Notwithstanding the change in direction, Boeing will continue to have a significant role as the U.S. Army transitions to its Brigade Combat Team Modernization strategy.

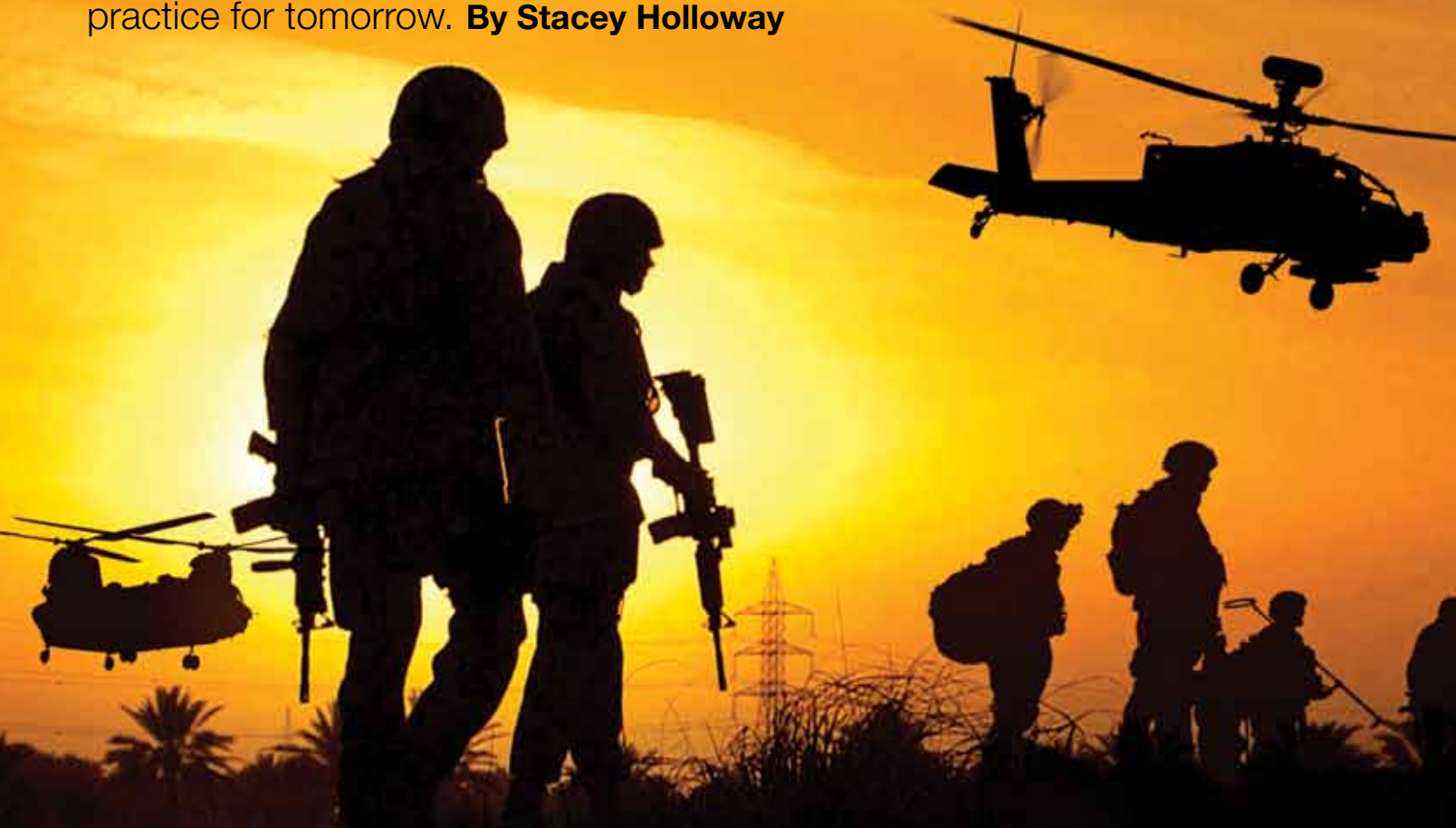
What best describes your leadership style?

Two words: people first. We're all very focused on flawless execution of the business and satisfying our customers. We all want to reduce costs and increase productivity. We want to grow into new markets. All of those objectives are enabled by a people-first strategy. When we invest in our people, recognize employees and help them develop, create an environment where everyone has a voice and a stake in the business, and give our people challenging assignments, they are motivated and empowered to give back to the business. This is more than a strategy to me. I really believe that investment in people is paramount—in life and in business. ■

LEFT: PHOTO BY U.S. AIR FORCE. ABOVE: GRAPHIC BY CHUCK SCHROEDER/BOEING.

Target acquired

Boeing positions itself in an **emerging market** that's **helping warfighters** practice for tomorrow. **By Stacey Holloway**



At ranges around the world, the U.S. Defense Department is conducting critical testing and training events. The ranges offer realistic combat environments in which aircraft drop real bombs and soldiers fire live ammunition. These test and training events are essential in ensuring that weapon systems, equipment and warfighters are ready for tomorrow's missions.

The Defense Department is looking to industry to help update range equipment and provide innovative service solutions, and Boeing's Global Services & Support business is quickly positioning itself for entry into this new market. Its Training Systems & Services division is focused on the development and delivery of innovative new systems, while its Defense Government & Services division is committed to providing the right people and services.

Frontiers recently spoke with the two GS&S leaders who are at the forefront of this new frontier.

Mark McGraw, vice president of Training Systems & Services

Tell us about this new market—Range Test, Instrumentation and Training.

There are test and training ranges across the United States

and really across the world, struggling with outdated technology, unique equipment and a lack of open computing architecture. High-performance modern aircraft such as the F/A-18 and F-35 require very precise positioning, and today's range equipment does not provide the necessary accuracy. Because of this, Boeing GS&S is taking a hard look at the needs of test and training ranges, and developing a common set of open-architecture systems that will sharply increase the capabilities at these facilities. These systems will handle everything from the dismounted soldier walking around the range to ground vehicles to a high-performance aircraft like the F-22. They will even have a ship-to-shore connector to tie in shipboard assets. Think of it like we are developing a family of positioning devices that rely on Global Positioning System navigation, data links to transfer GPS as well as other information from the person or platform, and recorders, in many cases, to record the data if you are not linking directly from the person or platform.

What technologies and capabilities are needed at ranges?

They need very accurate positioning equipment, new data-link capabilities—to really push through the large amount of data required to track everything on the range—as well as encryption because a lot of these new high-performance aircraft do not want their information being broadcast openly. Miniaturization is



PHOTO ILLUSTRATION: Operations at a live test, training and instrumentation range are shown in this artist's rendition. These ranges provide a real-world environment for air- and ground-based military activities. **SCOTT GIRARD/BOEING, NATHAN PIONKE/BOEING**

also important because you want to be able to integrate these systems easily onto the airplane, ground vehicle or dismounted soldier. For training, similar technologies are required. Accuracies aren't as important; however, tracking and recording remains crucial so that participants are able to see what they did right or wrong, allowing for more effective training.

Why is Boeing well-positioned for the range market?

This is the right fit for Boeing because we build a lot of the platforms involved at test ranges, have a lot of people working at test ranges, and possess a vast amount of expertise in training.

Greg Deiter, vice president of Defense & Government Services

Tell us about Defense & Government Services.

The division focuses on services to our customers using a competitive cost structure and access to the Best of Boeing. This is a key part in Boeing's strategy to compete and win new, innovative opportunities that are nontraditional and not related to Boeing airplane platforms. We have several core business capabilities in information services; infrastructure support services; range services; intelligence, surveillance and reconnaissance services; and contractor logistic support services.

Boeing has decided to enter a new market—range services. Tell us about it.

Boeing's Range and Technical Services organization provides a complete array of launch and range operations and technical support services. Programs currently supported are Ground-based Mid-course Defense sustainment, Future Combat support and Secure Border Initiative network support. We also ensure the readiness of the nation's Intercontinental Ballistic Missile Wing. We are expanding into the broader range-services market by using a proven systems approach to support the customer's consolidation and modernization of ranges. To do this, we use Boeing's test and training expertise as well as complex systems integration experience. The "\$50 billion over the next five years" market is attractive, profitable and growing.

What is Boeing doing to win these programs?

We are bringing the Best of Boeing in areas of large-scale system integration; Jeppesen scheduling and other tools; situational awareness; air traffic management; surveillance and security; multilevel information technology security; data mining and knowledge management; and live, virtual, constructive training. ■

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'Net' gains

Boeing-designed system is communications backbone for U.S. Navy missile destroyers By Paula Shawa

Surging through seas at speeds topping 30 knots (35 miles per hour, or 55 kilometers per hour), a U.S. Navy missile destroyer is an imposing presence. More than 500 feet (150 meters) long, bursting with an arsenal of offensive and defensive weapons and a crew of more than 270 men and women, it is one of the most powerful military surface ships, ably equipped to protect and defend.

Coursing through the destroyer, unseen but critical to its operation, is the Boeing-designed Data Multiplex System (DMS)—the communications backbone for this class of vessel.

DMS was conceived as a network solution for the Navy when today's Internet was still in its infancy. Its roots date back to the 1970s, when fax machines were hot new technology.

"We were creating a pre-Internet network," said Scott Meier, chief engineer for the DMS program. With a degree in electrical

engineering, Meier landed in balmy Southern California for his job interview in 1979 after shoveling snow from his driveway in Michigan earlier the same day. He never looked back, joining a team that has worked for many years to nurture DMS from its earliest stages into an operational system that can readily accommodate new technologies.

For more than 35 years, the DMS network has served the fleet of 60 U.S. Navy destroyers around the globe, providing near 100 percent reliability over countless hours of operation. Earlier this year, the Navy signaled its continued confidence in DMS by sustaining Boeing's role as the design agent for the network, and awarding the company a production contract for the latest order of DMS shipsets.

"It's mission critical and it's never been a reason for a ship not to sail," said DMS Program Manager Jay Nieto.

Also a program veteran, Nieto has cumulatively spent several years at sea helping develop DMS. Exhaustive testing on land and at sea paved the way for the Data Multiplex System to be formally incorporated into the contract design in the early 1980s for today's class of U.S. Navy missile destroyer, the *Arleigh Burke*, designated in Navy parlance as DDG 51. It was the first time a Navy ship contract design package included a digital, shipwide data network.

The impetus for DMS was simple: Replace miles of bulky, hard-wired, point-to-point cabling in legacy ship designs. The system works by multiplexing signals over a common coaxial cable infrastructure. IOUs—input/output units—are located throughout the ship to serve as the user interface with the network. The benefit to this design philosophy, as the DMS engineers like to describe it, is that it can be reconfigured without changing the basic footprint.

The network allows data transfer for basic shipboard systems, including navigation, steering, combat systems, weapon systems, damage control, and ship and machinery control systems. Simply put, DMS is fundamental to a ship's operation.

To date, there have been three versions of the DMS system, all still in use. U.S. Navy destroyers DDG 51-78 are outfitted with the first generation, the original copper-cable circuit-switching system presently managing approximately 4,700 signals across the network.

In the mid-1990s fiber optics replaced the copper coaxial cabling. The Fiber Optic DMS iteration simplified network hardware, reduced costs and enhanced backbone capacity from 2.4 MB per second to 100 MB per second and managing 14,000 signals.

The most current configuration is the Gigabit Ethernet DMS, which is being installed on DDGs 111 and 112, currently under construction. It offers even faster data transfer rates (1,000 MB per second) and can support multimedia services such as voice, video and data. It will aid the Navy's efforts to streamline personnel requirements by further supporting remote monitoring and control of machinery, increased

automation of routine operations and automated logging of critical system functions.

At shipyards in Bath, Maine, and Pascagoula, Miss., the Boeing face of the DMS program is its three field service representatives. Here, where the Navy destroyers are built and retrofitted, Rick Prevost, Bruce Matznick and Donnie Thompson work side by side with the shipbuilding contractors and Navy personnel during the installation and checkout of the DMS.

"Our job is to make sure the customer is getting what they're paying for," Matznick explained.

Boeing service reps also go to sea with ships to "prove out" the DMS and work directly with system operators.

At program management headquarters in Huntington Beach, Calif., the DMS lab is outfitted to replicate each evolution of the DMS network. Lab personnel can troubleshoot and resolve issues quickly and validate the small but ongoing changes made to the system.

Richard Kahn, a civilian, began as a project engineer at the program's inception and is now the Navy's DMS program manager.

"One of the keys of this program is being able to keep up with the needs of the user systems, and this program has always done that," he said. "We have constantly kept it up to date to perform those new functions."

The DMS team is exploring new capabilities that will further enhance the system. Sales to international customers also will continue. Three of the Gigabit Ethernet DMS shipsets recently contracted will be delivered to foreign militaries—as will application of DMS to other U.S. Navy ships. ■

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PHOTOS: (LEFT) U.S. Navy Sonar Tech 1st Class Steven Duncan stands watch in the Combat Information Center aboard a missile destroyer fitted with Boeing's Data Multiplex System.

(RIGHT) U.S. Navy missile destroyers in the DDG-51 *Arleigh Burke* class rely on the Boeing Data Multiplex System as a communications backbone. U.S. NAVY

“One of the keys of this program is being able to keep up with the needs of the user systems, and this program has always done that.”

– Richard Kahn, Boeing Data Multiplex System program manager, U.S. Navy



The little line that could

Small munitions team produces **big results** for warfighters.

By Kevin L. Smith

Boeing munitions mechanics in St. Charles, Mo., are proving that you don't need large numbers to get the job done.

On a single mixed-product assembly line, only 18 workers are needed to produce nearly 1,000 bombs per month for U.S. and international customers—about 700 Joint Direct Attack Munitions (JDAM) and 240 Small Diameter Bombs (SDB).

"Teamwork is at the heart of what we do," said Kevin Dorsey, JDAM/SDB production manager. "By working together and establishing the single assembly line, we were able to successfully cut down on cost and time, which was our main goal. We will continue to look for innovative ways to make the work we do more effective and efficient."

The High Performance Work Organization (HPWO) team has taken a unique approach to increase productivity and sustainability on the assembly line. Each mechanic is trained to perform all jobs on the line, from JDAM and SDB assembly to shipping and receiving of parts. Each day, the mechanics rotate positions to optimize efficiency, maximize cross-training, reduce injuries due to repetitive operations, keep employees engaged and make it easier to adjust assignments for unplanned absences.

"We are a small group and we have the chance to do a variety of tasks. We are able to learn the whole system rather than focusing on a single operation," said Terry Griffin, munitions mechanic.

The team, which boasts a Stage Four maturity level, the highest level an HPWO team can attain within Boeing, also stresses the importance of lean manufacturing.

"The emphasis on Lean manufacturing reduces waste in the process," said Floyd Cline, production manager of the Weapons Programs manufacturing facility.

PHOTO: Terry Griffin performs final assembly of a Joint Direct Attack Munitions tail kit, one of many tasks each munitions mechanic is trained to perform.

RICHARD RAU/BOEING

In addition to stressing lean manufacturing practices, the team has changed the way the line works by utilizing a "rebalancing" process to maximize efficiency. The line has been rebalanced three times since 2002, and the results have been substantial.

The most recent rebalance was initiated in February by an employee Production Preparation Process, or 3P, team and identified options for running the munitions assemblies of JDAM and SDB down the same production line. In just a week, the team determined the best way to run the line, including the frequency of running mixed munitions.

"Since SDB has been added to the line, it has created a synergy with JDAM and has resulted in a reduction in cost for SDB," said Dan Meyer, Operations director and site manager for Weapons Programs. The previous rebalances took place as a result of rate reductions to maximize efficiency, meet demand, decrease input and increase output to meet customer needs.

The team worked on rebalancing the line to the new takt time (the maximum time allowed to produce a product in order to meet demand), while ensuring that the work content for each station was equal and below the takt time. They also were able to develop good descriptions of all the support positions needed to ensure that production goals continue to be met for JDAM.

Dan Jaspering, director of Direct Attack Programs, noted that it is ultimately the warfighters who benefit from the hard work of the JDAM/SDB team. "Supporting the troops is our top priority and focus. We are committed day in and day out to providing the weapons and systems they need to complete their missions. We never forget that their lives depend on us." ■

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Star performer

Boeing's renewed ENERGY STAR partnership helps cut energy use, protects environment. By Glen Golightly



By retrofitting air-conditioning and heating systems and installing more efficient lighting and automated controls, Boeing reduced energy consumption at one of its Houston site office buildings by more than 2 million kilowatt hours annually.

That's enough electricity to power 170 homes.

For that conservation effort, the building on Bay Area Boulevard earned Boeing's first ENERGY STAR label.

Created in the 1990s by the Environmental Protection Agency and perhaps best known to consumers for energy-efficiency ratings on products such as TVs and home appliances, the ENERGY STAR program today is jointly sponsored by the EPA and the U.S. Energy Department. It is dedicated to helping businesses and homeowners save money and protect the environment through energy-efficient products and practices.

"This is another way we're demonstrating our commitment to protecting the environment," Boeing Chairman, President and CEO Jim McNerney said when he signed a new agreement in September that recommitted Boeing to its partnership with ENERGY STAR.

"Continuously increasing energy efficiency and conservation will help Boeing meet our financial goals and will aid in preserving the environment for future generations. We're pleased to join with ENERGY STAR in this important work," McNerney said.

"Because commercial and industrial facilities account for about half of U.S. greenhouse gas emissions, Boeing's leadership is important to protecting our global environment," said Kathleen Hogan, EPA Climate Protection Partnerships Division director.

In 2008, Boeing established aggressive targets to improve energy efficiency, reduce greenhouse gas emissions intensity and improve recycling rates 25 percent by 2012 at its major manufacturing facilities. The company also established a comparable goal for hazardous-waste reduction.

A qualified facility, such as the Bay Area Boulevard building, meets strict energy-performance standards set by EPA—it uses less energy, is less expensive to operate, and produces fewer greenhouse-gas emissions than its peers. ENERGY STAR tools help analyze building performance and energy management program effectiveness for continuous improvement.

Boeing is also participating in the "Change the World, Start with ENERGY STAR" campaign to increase energy efficiency at home. So far in 2009, Boeing employees have pledged to make energy reduction changes saving more than 8 million kilowatt hours of electricity and eliminating the more than 14.6 million pounds (6.7 million kilograms) of greenhouse gases created while generating that power.

Energy conservation specialist Alan Griffin, who manages Boeing's partnership with ENERGY STAR, has seen a significant increase in energy and environmental awareness across the company in recent years.

"Employees want to know how they can get involved to help save energy. People are changing their energy-consumption habits at work and at home," Griffin said. ■

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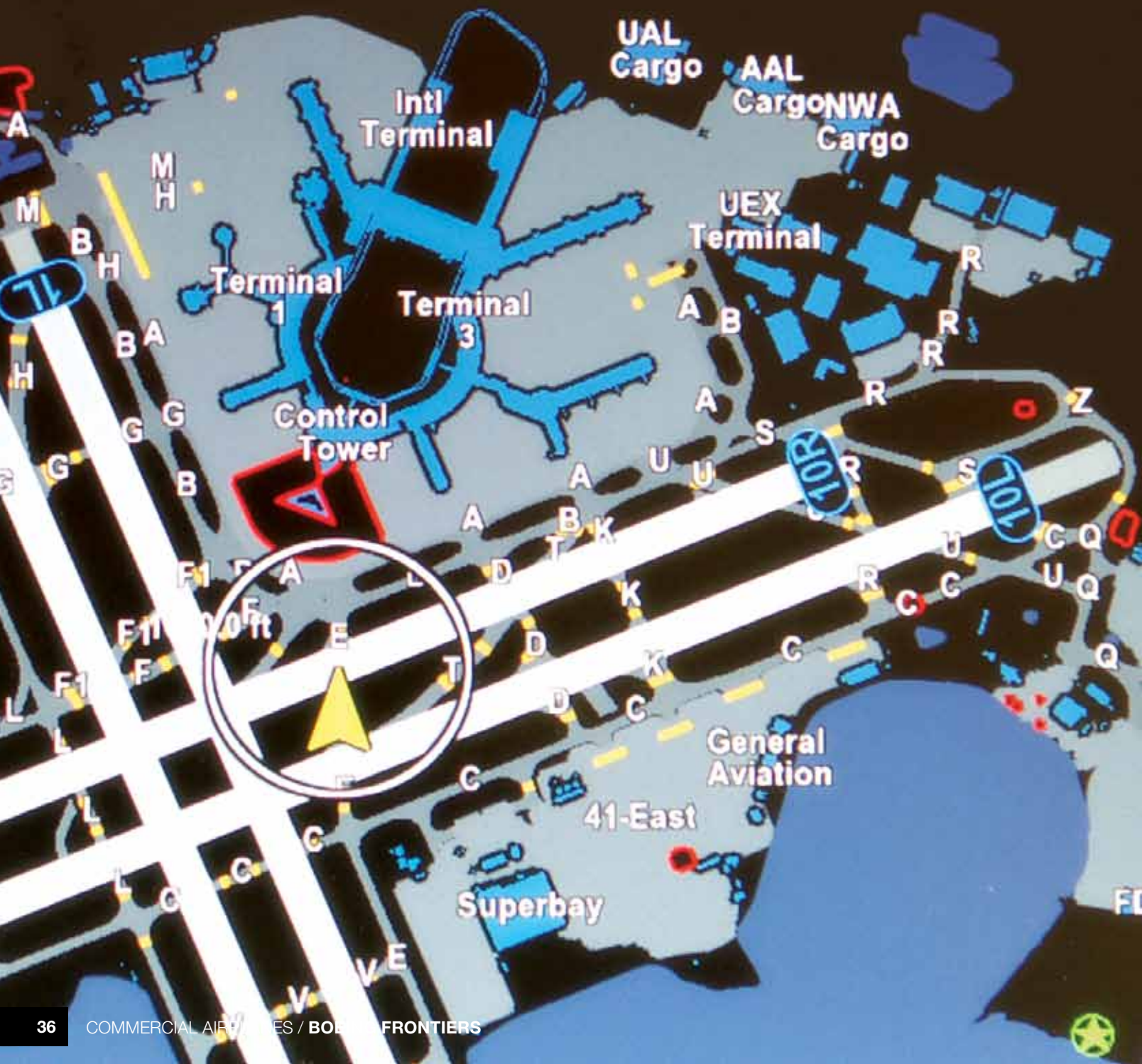
PHOTO: Boeing Houston Maintenance Technician Dennis Cilburn (right) discusses a ventilation system check with John Listi of McQuay, a ventilation system supplier. ELIZABETH MORRELL/BOEING

Boeing is stepping up efforts and encouraging all employees to take the ENERGY STAR pledge for lighting replacements as well as other energy-saving measures.

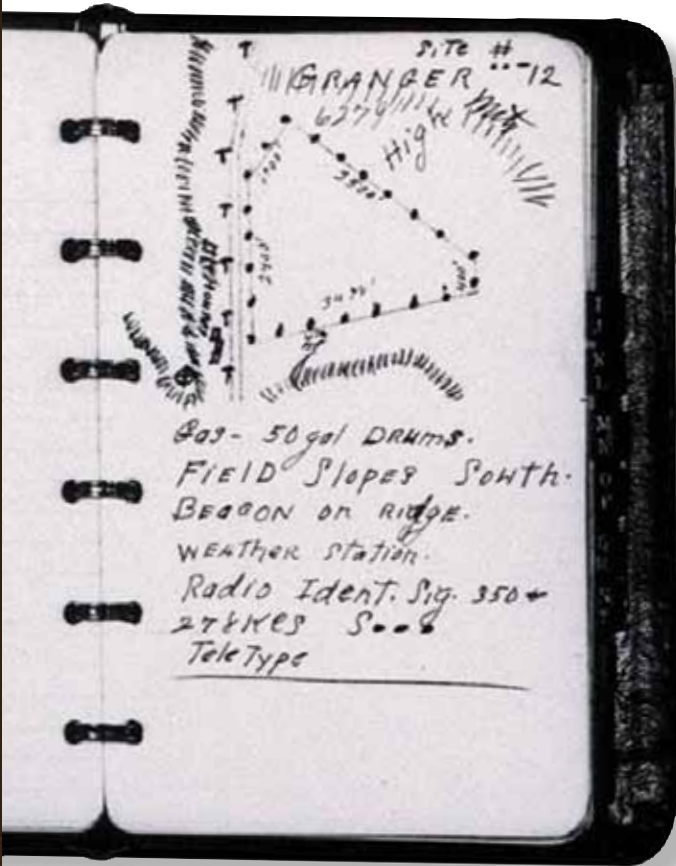
For more information on how to participate, see the ENERGY STAR Web site: <http://www.energystar.gov>

Another site to visit is the Environment Information Center on the Boeing intranet at: <http://ehs.web.boeing.com/enviro>

Charting



the course



From hand-drawn air navigation maps to the Electronic Flight Bag, Boeing subsidiary Jeppesen charts the future—on land, air and sea. **By Dawsalee Griffin**

PHOTOS: (LEFT) Highly accurate digital navigation data support applications such as this Jeppesen Airport Moving Map for taxiing flight crew.

(ABOVE AND RIGHT) Company founder Elrey Jeppesen started sketching airport maps to fly more safely. JEPPESSEN

In the basement workshop of his Salt Lake City home, airmail pilot Capt. Elrey Jeppesen, concerned about the safety of pilots because they didn't have proper navigation maps, produced the first instrument flying charts, depicting routes using new radio aids and flight patterns. It was 1934 and Jeppesen was flying for United Airlines, after previously barnstorming and flying for Boeing Air Transport.

Seventy-five years later, the company that Jeppesen founded and bears his name not only provides charts and navigation information but also offers pilot training, crew scheduling and trip planning for the aviation industry. And it is expanding into the marine and rail industries.

"Today, millions of commercial and private flights, thousands of ocean voyages and tens of millions of boating trips rely on digital navigation from Jeppesen," said Greg Bowlin, senior vice president and chief strategy officer of Jeppesen, a Boeing subsidiary. "Every day, more than a million people use Internet-based applications supported by Jeppesen technology to plan their rail travels, and some of the world's largest railroads use Jeppesen to plan their daily work schedules."

In September, Jeppesen introduced its new C-MAP 4D application for boaters, which features high-resolution 3-D coastal imagery overlaid on continuously updated vector data. The company also has added online training for sport and private pilot licenses.



“In 1973, we were updating 100 to 150 charts a week by hand. Today the department revises 1,000 to 1,500 charts a week using computer graphics and a variety of other electronic production tools.”

– Ted Thompson, corporate technical leader for charts and display standards

Both are complete courses and include multimedia lessons and preparation for FAA knowledge exams.

From the beginning, Jeppesen has been at the forefront of navigation in the aviation industry. In the early days of commercial flight, pilots used landmarks and roads to navigate visually. “Capt. Jepp,” as he was known, was concerned about safety and began documenting the routes he flew as an airmail pilot. His “little black book” included airport sketches, runway lengths and other information about the airports and surrounding terrain. Once other pilots learned about his notes and sketches, they began asking for copies.

The demand for Jepp’s navigation charts continued to grow, and in 1934 he

founded Jeppesen & Co. to sell the charts. By this time, aviation navigation technology had taken its first leap forward: Pilots began to navigate using ground-based, low-frequency radio, and Jeppesen provided the first instrument-based navigation charts. The company moved to Denver in 1941, where it is still based. Today, Jeppesen has 42 offices in 22 countries.

Capt. Jepp worked with what was then the Civil Aeronautics Administration (now the Federal Aviation Administration), to introduce in 1947 the first standard instrument approach procedures and to establish the National Flight Data Center. Jeppesen later set up an office in Frankfurt, Germany, to fulfill a contract with the U.S. Army. Today, that German

operation is strategically located to serve Europe, Asia, Africa and the Asia Pacific area.

Jeppesen both drives and reacts to technology changes in the aviation industry, according to Ted Thompson, corporate technical leader for chart and display standards. When Thompson joined Jeppesen as a draftsman in 1973, charts were updated and maintained by hand using strip film, film transparencies, and pen and ink overlays. In the early 1980s, the company entered a new frontier by making the charts digitally. Not only did the change improve accuracy and make maintenance easier, but Jeppesen laid the foundation for new products such as JeppView electronic charts and the



Electronic Flight Bag, which replaces heavy, hand-carried bags containing paper charts and other printed materials that pilots use.

“The conversion also made it easier to manage the increase in charts and aeronautical information around the world,” Thompson explained. That helped Jeppesen keep up with customer demand for new charts and new services.

“When I started in 1973, we were updating 100 to 150 charts a week by hand,” Thompson said. “Today, the department revises 1,000 to 1,500 charts a week using computer graphics and a variety of other electronic production tools.”

Jeppesen also has made use of new technology to improve how the charts are printed and distributed. Even as demand grows for electronic charts and integrated computerized navigation systems, the need for paper charts and manuals remains. Jeppesen systematically replaces old offset printing presses with new print-on-demand printers to reduce the number of pages to be hand-collated.

Using the offset printing method resulted in 87,000 pigeonholes, or small cubbyholes used to store printed charts and pages, said Ken Navarra, manager of Imaging and Printing Services. As a result, much of the collating of the Jeppesen Airway Manual was done by hand. Now, the new equipment reduces the number of hand-collated

pages to fewer than 15,000 and greatly speeds production.

“Some things, however, haven’t changed since the company’s founding,” said Mark Van Tine, Jeppesen president and CEO. “Jeppesen’s leadership is committed to continuing the tradition of providing high-quality, innovative products and services while retaining the focus on employees.”

Bowlin, chief strategy officer of Jeppesen, said the company already is planning for the next 75 years. “While we have certainly come a long way in how we support travelers around the globe, we look forward to the next 75 years to continue the innovation of products and services that transform the way the world moves in the air, on the water and over land.” ■

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PHOTOS: (LEFT) The Electronic Flight Bag brings computer information management to the flight deck. ED TURNER/BOEING

(ABOVE) Digital technology is obsoleting the need to print and periodically update thousands of aeronautical charts. JEPPESEN

- 1934** Capt. Elrey Jeppesen launches business in the basement of his Salt Lake City home
- 1941** Company moves to Denver
- 1947** Jeppesen works with the Civil Aeronautics Administration (now the FAA) to establish standard instrument approach procedures and the National Flight Data Center
- 1957** Jeppesen opens a Frankfurt office to better serve U.S. Army
- 1974** Jeppesen and Sanderson Films, a pilot-training company, merge to form Jeppesen Sanderson
- 1989** Jeppesen acquires trip-planning firm Lockheed DataPlan
- 2000** Jeppesen acquires Nobeltec, provider of marine navigation services
- 2000** Jeppesen becomes Boeing subsidiary
- 2002** Jeppesen introduces Electronic Flight Bag
- 2005** Jeppesen launches marine division
- 2006** Jeppesen acquires Carmen Systems, provider of crew rostering services
- 2007** Jeppesen acquires C-Map, provider of leisure and commercial marine charting services

Best in **test**

Dennis O'Donoghue

Vice president, Boeing Test & Evaluation
Engineering, Operations & Technology



Boeing's test and evaluation units are being integrated into one team. Its leader tells why this means better support for Boeing programs.

By Jennifer Hawton and photo by Bob Ferguson/Boeing

As a Boeing test pilot, Dennis O'Donoghue worked to ensure the company's products performed as promised. Today, he's still focused on making sure Boeing is providing quality products and services—but now as the leader of an enterprisewide test and evaluation team.

O'Donoghue is vice president of Boeing Test & Evaluation, one of two companywide organizations created in January within Engineering, Operations & Technology. BT&E is responsible for the test and evaluation of new Boeing airplanes, modification and upgrades to existing aircraft, and test support to certain Boeing businesses.

Since January, BT&E has focused on establishing its foundation and integrating the test and evaluation assets of Integrated Defense Systems and Commercial Airplanes. Among BT&E's many activities are identifying its core capabilities; creating its strategic plan and concept of operations; and bringing test and evaluation employees from across the enterprise into the BT&E fold. By the start of 2010, the formation of BT&E should be 90 percent complete.

BT&E faces the task not only of building a team and integrating people and assets from around the company but also of fulfilling its obligations to Boeing businesses, especially as several high-profile development programs approach first-flight milestones. *Frontiers* spoke to O'Donoghue about BT&E's goals and challenges.

What is the role of BT&E?

Our objective is simple. It's to help Boeing reach its goal of being the world's best and best-integrated aerospace company. Because we're an enterprisewide test and evaluation organization, our teams can use common processes and tools and share Lean practices. And we can allocate our resources more efficiently and better manage our knowledge, skills and expertise throughout Boeing. By doing all this, we'll ensure that we are the "best in test."

Why is Boeing doing this now?

To remain competitive Boeing will always need to find ways to operate more efficiently and effectively as one company. As economic conditions get tougher and our markets get more competitive, we have to be more aggressive in making these improvements. That's why this is the right time to stand up BT&E.

At the same time, we are proceeding in a carefully coordinated way to support all program and business milestones. That way, we can ensure we will meet long-term growth and productivity goals, as well as near-term challenges.

Parts of both IDS and Commercial Airplanes are being integrated into BT&E. How can you make sure this won't affect 787 Dreamliner and 747-8 flight tests?

I want to make this clear: We are committed to delivering on our promises while we manage our large-scale integration. Our

guiding principle has been to not disrupt current programs while we integrate T&E teams across the enterprise. We have gone to great lengths to ensure that we don't get distracted from our No. 1 priority, which is to deliver on our customer's expectations.

In fact, the flight-test programs for these airplanes will be great examples of how BT&E provides better support to Boeing businesses. Because BT&E is a centralized, enterprisewide test and evaluation team, we can more closely track the test and evaluation needs of all programs—and be assured that we have the right people in the right place at the right time.

What are your expectations for BT&E into 2011?

We have a lot to do. That includes fully standing up the organization, with our own accounting structure within EO&T and with test and evaluation employees from across Boeing fully enrolled.

First, I expect BT&E to execute on our current commitments. We have multiple important test programs going on in 2010 and 2011, such as the P-8A, 747-8 and 787, to name a few. And while we must focus on integrating our test and evaluation capabilities, we can't afford to miss a beat on the work we have right in front of us.

Second, we must strive to raise the level of operational excellence. We've shown over the years that, in many regards, Boeing has the best test and evaluation organization in the industry. What we do, we do very well from a technical perspective. However, now we must focus on doing it more efficiently than ever before. Our markets are only going to get more competitive, so we must find a way to reduce our costs and improve the effectiveness of our services.

Finally, I want people to have fun. I want them to wake up in the morning wanting to come to work at Boeing. And at the end of their shift, I want them to walk out the gate feeling like what they did that day added value to Boeing. ■

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To learn more about the Boeing Test & Evaluation organization, visit its site on the Boeing intranet:

<http://test-evaluation.web.boeing.com>

This site offers information such as:

- Access to the BT&E blog on the Boeing intranet
 - Updates on BT&E's integration efforts (look for the link to the BT&E Weekly Updates page)
 - The organization's structure, strategies, operating principles
 - An explanation of the organization's 19 capabilities (to view a Powerpoint presentation that describes these capabilities, visit the BT&E home page and enter the phrase "19 capabilities" in the search field)
-



Coaching change

A little help can go a long way when making healthy lifestyle changes.

By Susan Birkholtz and Bridget O'Meara

Trying to get motivated to eat better, stick to a regular exercise routine, quit tobacco or manage stress?

You are not alone. People who have succeeded in improving their well-being in these areas often attribute their success, at least in part, to working with an outside expert such as a trainer, healthy lifestyle coach, a tobacco cessation coach or Employee Assistance Program counselor to help them set goals and then take steps to get, and stay, healthy.

What follows are personal stories of Boeing employees who found that it's sometimes easier to make healthy lifestyle changes with a little help. ■

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Share a success story. We would like to hear from other employees who have made positive changes to better their well-being. From Outlook, e-mail GRP Boeing Well Being.

Resources:

For more information on the Health Assessment, healthy lifestyle coaching or the Quit For Life program, visit: www.BoeingWellness.com

For more information on stress-management coaching, visit: www.BoeingWellness.com

To learn more about the Employee Assistance Program, call 1-866-719-5788 within the United States. International employees can call Canada collect at +1-905-270-7658. You also can visit: www.Boeing.com/eap

For Family Care Resources and referrals, call 1-800-985-6895 or visit: <http://familycare.web.boeing.com>



Stress busters

A few years ago, Bridget Vavasseur, manager of the Boeing Store in El Segundo, Calif., was under a lot of stress at home and at work. Her daughter was about to graduate from high school. She had some aggressive sales goals at work and little time to meet them. Vavasseur was so anxious that she would sit in her office after the store closed just to relax for a while before driving home.

Her heightened stress did not go unnoticed when she completed the online Health Assessment that fall. Her health risk levels for stress were off-the-charts bad. But the good news was that she qualified to work with a stress-management coach from the Mayo Clinic over the phone. Vavasseur jumped at the chance.

"The coach was really nice. I told her how I was feeling. We

just talked," Vavasseur recalled. "She taught me to incorporate a number of stress-management tools into my everyday life. One simple one was to just stop and take a few breaths during times when I start to feel really stressed. That really helped, just to stop and breathe."

The coach pointed Vavasseur to other tools as well that helped her control stress.

Now, life is less stressful for Vavasseur than a few years ago. But she knows what to do just in case. "I still use the tools that my stress-management coach taught me. They're incorporated into my daily life now. They've made a big difference."

PHOTO: PAUL PINNER/BOEING



Fresh start

With a 4-year-old son and another baby on the way, former smoker Jay Zayic decided he needed to change his lifestyle to be a good role model for his children.

"It was getting to the point where my son would see me smoking, and I didn't want him to learn any bad habits from me," said the 31-year-old Commercial Airplanes engineer in Renton, Wash. After taking the Health Assessment last year, he signed up for the Quit For Life program. Zayic also signed up for healthy lifestyle coaching to help him get—and stay—physically active and avoid putting on excess weight while he was in the process of quitting.

Over several months, Zayic had regular phone calls with both his coaches. "The best thing for me was to regularly talk with

someone," he said. "I found that I was less self-conscious and more honest and straightforward when I talked with someone I didn't know. The calls really kept me on track. ... I wasn't sure how talking to someone would help me quit smoking and stick to an exercise program, but I found that having two heads working on a problem was better than one."

Before he stopped smoking, Zayic recalled, he could hardly catch his breath after running. "Now, my legs are giving out before my lungs, and I feel good when I'm done running. I'd encourage other people to try these programs. It's tough to make lifestyle changes on your own."

PHOTO: MARIAN LOCKHART/BOEING



Making the call

Cheryl D'Ambrosio, a 25-year Boeing veteran and process developer and integrator with the Flight Operations Test and Validation organization, describes her family's lifestyle as "living life between the bleeds."

For the past 17 years, she has been the caregiver for her stepdaughters, both of whom were born with a rare and severe form of hemophilia. Managing the girls' care requires frequent emergency room visits, countless blood transfusions and numerous hospitalizations. She and her husband must juggle work and home demands while attending to the girls in the hospital.

Early on, D'Ambrosio realized that to be an effective caregiver she had to take care of herself. She uses the Boeing fitness centers to stay fit and work off stress. Additionally, she participates in

on-site wellness screenings to monitor her blood pressure, cholesterol and other indicators. D'Ambrosio also has completed Stress Solutions, an eight-week stress management program offered on www.BoeingWellness.com and designed by health experts.

"I found lots of gems in their online program that gave me new ways of seeing things and hope," she said.

A few years ago, D'Ambrosio also took advantage of the Boeing Employee Assistance Program. "Sometimes, it helps to say things out loud to someone who is trained in listening to people in times of stress," she said. "I used to be reluctant to call, but I found EAP counselors help you sort things out and talk over what you might do to address your issues."

PHOTO: MARIAN LOCKHART/BOEING

When duty calls

Boeing honors the men and women who have served, and who continue to serve, in the military, defending freedom around the world. More than 27,500 veterans and reservists work for The Boeing Company. Here are a few of their stories.





Dennis Durrwachter

Programmer analyst • Engineering, Operations & Technology • Robotics • St. Louis

SERVICE: U.S. AIR FORCE, 1971 TO 1975

My father was a World War II veteran and always had stories about his travels as a U.S. Navy pilot. As a boy, I thought it sounded really exciting. After high school I joined the Air Force hoping to see the world, although I really didn't get to travel much while in the service. But I ended up working with veterans in a way I never could have imagined back then.

My permanent duty station was Whiteman Air Force Base here in Missouri, where I was a missile systems analyst specialist. It was our job to troubleshoot and repair support equipment for Minute-

man missile sites and launch-control centers so the missiles could remain in what was called Strategic Alert (ready to launch). This was a weapon that could change the course of history. It was a profound realization for a 19-year-old.

After the service I used the GI Bill to get an engineering technology degree from Purdue University and joined McDonnell Douglas in St. Louis in 1980.

My life changed in 1999 when my dad and I were partially paralyzed in the crash of a small airplane. Now I get around in a wheelchair. It has opened a lot of doors

for me with a lot of different experiences. I'm active in the St. Louis Gateway chapter of the Paralyzed Veterans of America, or PVA. We advocate for the disabled in St. Louis, especially for the health care of disabled vets using the Veterans Administration health care system. It's a great organization and I'm very proud of everything we do.

You can learn more about the PVA at its Web site: Gatewaypva.org

PHOTO: BOB FERGUSON/BOEING

Kermitt Glenn

Inspector, F-15 program • St. Louis

SERVICE: U.S. COAST GUARD, 1975 TO 1979

I joined the U.S. Coast Guard in 1975 and remember a boot camp sign that read, "You are embarking on a new life." How true that was as I trained to be a helicopter air crewman. At every turn, opportunities unfolded and I found myself helping others in air-sea rescues.

Stationed in New York, we would fly around Manhattan and respond to search-and-rescue calls for help. When I see current photographs of New York City, I see the World Trade Center Twin Towers

missing. It really hits home and I realize why I served in the Coast Guard. My heart goes out to all 9/11 victims and families.

In rescuing people you realized how sacred a life is, from finding a body in the water to saving entire families and crew. Experiencing both scenarios helped me understand the importance of God and country, to put my life on the line. The Coast Guard, many times, is the last hope for people lost at sea.

I honorably left the Coast Guard in 1979 and enrolled in Parks Air College, St. Louis University, where I earned a Bachelor of Science degree in aircraft maintenance. My Boeing career began in 1982 at McDonnell Douglas. I'm currently an inspector on the F-15 program. At Boeing, I've met veterans of Vietnam, Desert Storm and other theaters. I take my hat off to all veterans. They're all heroes to us.

PHOTO: BOB FERGUSON/BOEING





Michael J. Sanderson

Senior manager • IDS, C-17 Systems Installation • Long Beach, Calif.

SERVICE: U.S. MARINE CORPS, 1982 TO 1986 • MARINE CORPS RESERVE, 1987 TO PRESENT

Nearly 28 years in the U.S. Marine Corps and 24 years at McDonnell Douglas and Boeing have brought me tremendous opportunity: the chance to work on and fly aircraft that I love, earn a Federal Aviation Administration Airframes and Power Plants License, gain undergraduate and graduate degrees, and have the honor to serve with my fellow Marines in Iraq. I am currently on the faculty at the University of Phoenix and Embry Riddle Aeronautical University.

Growing up in eastern Iowa, I was intrigued with flying from an early age. In my youth, a friend and I loved to take off from an alfalfa field in a Piper Cub for low passes over the local towns.

By 1982, I knew farming was not my long-term ambition. I joined the U.S. Marine Corps to pursue an aviation career. I trained to maintain and fly the CH-46 Sea Knight, never dreaming I would one day work at the company that builds that tandem-rotor helicopter.

In 1986, I took a job at McDonnell Douglas as a structures mechanic. I was promoted to manager in Production that summer.

I missed Marine Corps style flying, though, and so in 1987 I re-entered the Marine Corps Reserves at El Toro, Calif. In 1991, I was activated to deploy to the first Gulf War. Shortly after returning to McDonnell Douglas, I was promoted to senior

manager on the MD-11 Program.

In 2000, I transferred from the air wing of the Marine Corps to an armored tank unit and was activated as a first sergeant with Force Protection at Camp Fallujah, Iraq, in 2005.

I was promoted to the rank of sergeant major in 2006—one of only 52 senior enlisted Marines of that rank in the Marine Corps Reserve.

Strong camaraderie and leading by example is a way of life in the Marine Corps. In industry, as in the military, leadership means taking care of your people, finding a way to accomplish the mission, setting high standards, and settling for nothing less from yourself.

PHOTO: BOB FERGUSON/BOEING

Monica Flores

Employee development specialist • Learning, Training and Development • St. Louis

SERVICE: U.S. AIR FORCE, 1988 TO 1992 • AIR FORCE RESERVES, 1993 TO PRESENT

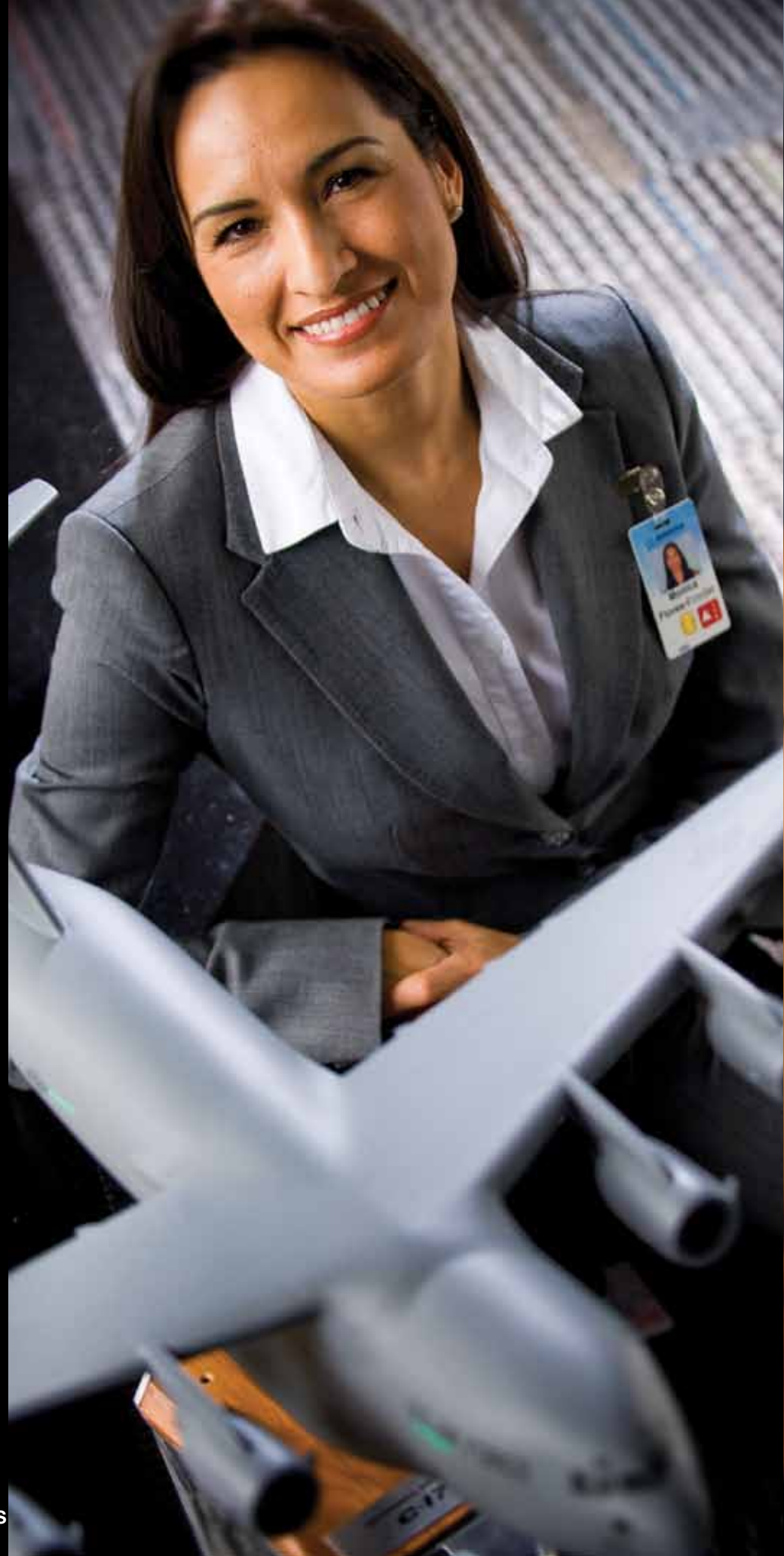
I had been out of high school for a couple of years in 1988 and joined the Air Force to follow in my older brother's footsteps. It was one of the best decisions I ever made—absolutely no regrets and I'd do it again in a heartbeat. I experienced Desert Shield/Storm while on active duty and Operation Iraqi Freedom and Enduring Freedom when my reserve unit was activated from 2003 to 2006.

As a C-17 Loadmaster I was responsible for everything located behind the flight deck, including supervising the loading crew, providing for the comfort and safety of the troops, and accomplishing personnel and cargo airdrops. We'd leave Charleston Air Force Base in South Carolina, stop at a staging point in Europe, and then fly on to locations within Iraq and Afghanistan. From there we would pick up and drop off cargo and personnel. This cycle would last up to 21 days, at which point we would head back to Charleston and start over again.

My military experience helped me get a job with Boeing in 1997 as a C-17 simulator instructor. I moved to St. Louis about a year ago and now work in the Learning, Training and Development organization supporting Midwest Supplier Management.

My experience in the Air Force has transformed my personality and outlook on life. It hasn't been easy by any means, so my accomplishments have built my confidence and helped me to not only be a leader but also see when I need to follow. As a military member, it helps so much to have a supportive work group here at Boeing that understands my need to be away to fulfill my reserve obligations. I'm grateful for all the experiences and everything I have been able to accomplish.

PHOTO: BOB FERGUSON/BOEING





Eunice Warren

Human Relations generalist • Apache Worldwide Support program • Global Services & Support • Mesa, Ariz.

SERVICE: U.S. ARMY, 1977 TO 1998

I served in the U.S. Army for 21 years, primarily in logistics, and retired with the rank of sergeant first class. I wanted a military career from an early age. I announced it to the family when I was 15 years old. This wasn't as much of a surprise as it might have been in some families. My father had been in the Army, and four of my six brothers and two of my nine sisters, including my twin sister, also served in the military.

The Army gave me the chance to see more of the world and gain some training and experience. I've been stationed at bases throughout the United States, mostly with aviation units. I also had the opportunity to work in protocol at the U.S. Consulate in Berlin in 1990, when the Berlin Wall was coming down. It was thrilling to feel a part of history being made. A high point of that service came when I had the opportunity to greet Colin Powell, who was then chairman of the Joint Chiefs of Staff.

My experience working with people in the U.S. Army translated directly to my Boeing career. I came to Boeing as an administrative assistant in Human Resources, then gained greater responsibilities through a series of positions, up to my current position as HR specialist. My military career reinforced lessons I learned at home. Difficult situations may arise because the people we work with are reacting to stress that we are not aware of. But we don't have to let that affect our judgment or behavior. We can overcome the stress of any situation by relying on our own strengths and training and remaining focused on the task at hand.

PHOTO: BOB FERGUSON/BOEING

Kirk Almquist

Field mechanic • Commercial Airplanes,
737 Preflight • Renton, Wash.

**SERVICE: U.S. AIR FORCE, 1977 TO
1983 • RETIRED FROM AIR FORCE
RESERVES IN 2009**

My U.S. Air Force career began in June 1977, the summer after my sophomore year in high school. Through an innovative program, I began basic training at Lackland Air Force Base in San Antonio, Texas, then attended technical school at Chanute Air Force Base in Illinois. I reported one weekend a month during the school year. During the winter break of my senior year, I deployed with a maintenance team for three weeks to Yakota Air Base in Japan.

I served my first enlistment through 1983 as a crew chief on the Lockheed C-141A Starlifter. Then I returned to the reserves in 1984 to become a flight engineer on the C-141B. Through 1989, I flew from bases in Europe, Southeast Asia and the Outback of Australia.

In 1987 I joined Boeing and, as my work here began to demand my full attention, I transferred to the inactive reserves in 1989. I found that I wanted to continue my career in the Air Force but with less of a travel requirement. So in 1994, I transferred to the Air Force Security Forces as a weapons instructor under the Combat Arms shop.

The attack on the World Trade Center brought the importance of weapons training into keen focus. With the sudden requirement for security and training personnel, my squadron was activated on Sept. 23, 2001. We hit the ground running, training 16,000-plus people—both active and reserve—during 2002 and 2003. We sometimes worked 16 hours a day.

I retired with the rank of senior master sergeant with 30 years of service. The people made it a great experience through many demanding times. The camaraderie is something you just can't explain to someone who has not experienced military service. I miss it. But I stay in touch. Some of the security guards right here at Renton Field are members in the unit I belonged to, and that helps me keep up with what's going on. **PHOTO: JIM COLEY/BOEING**



Boeing Company – BA

NYSE: Industrials/Aerospace & Defense

As of 10/23/09

\$49.89

Stock snapshot

52-week range:	
52-week high	\$68.75
52-week low	\$29.05

International competitors

EADS* – EAD.PA

As of 10/23/09	€3.95
52-week range:	
52-week high	€6.69
52-week low	€1.12

*Prices in euros

U.S. stock indexes

S&P 500

As of 10/23/09	1,079.60
52-week range:	
52-week high	1,313.15
52-week low	666.79

S&P 500 Aerospace and Defense Index

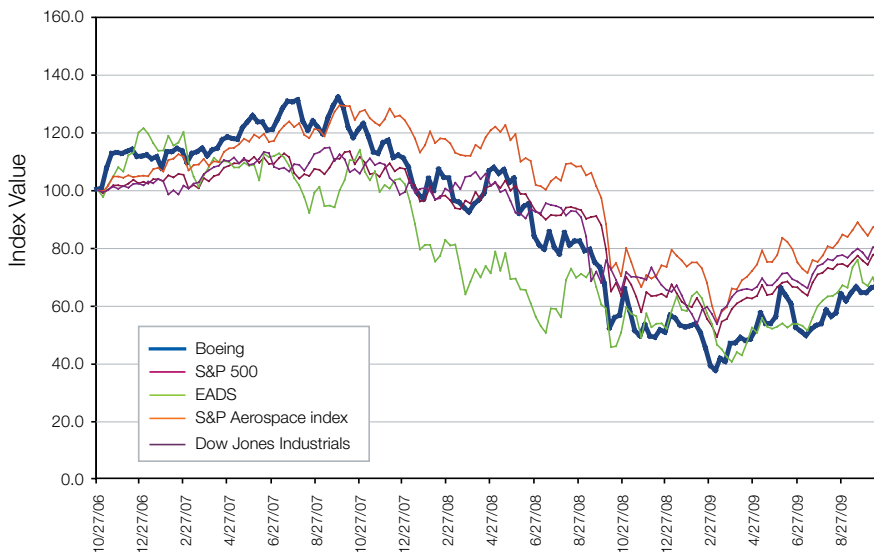
As of 10/23/09	313.73
52-week range:	
52-week high	322.00
52-week low	194.13

Dow Jones Industrials

As of 10/23/09	9,720.18
52-week range:	
52-week high	10,092.19
52-week low	6,626.94

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 Oct. 27, 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

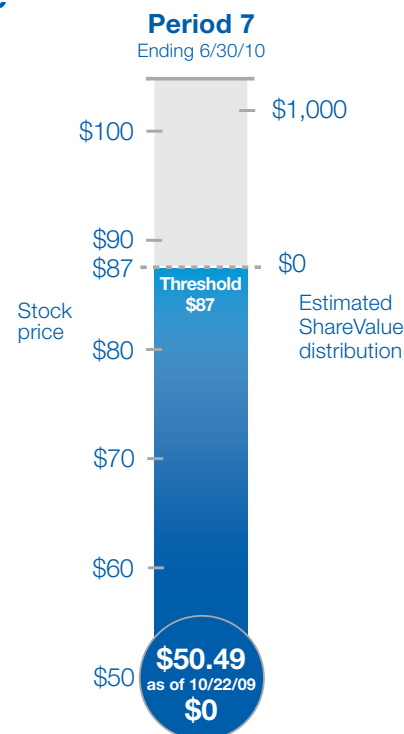
ShareValue Trust, or SVT, is an incentive plan that allows eligible participants to share in the success of their efforts to improve productivity and grow the business.

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.



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

50 years

Edward Kane
Frank Lennert

45 years

Priscilla Axe
William Barry
John Davis
Alice Lamkin
William Prothero
Michael Tarkanian
Kenneth Wenner

40 years

Randall Atkinson
Russell Bjornsen
Daniel Borgmeyer
David Boughner
Gilbert Farmer
George Kliskey
Robert Kono
Steven Moore
David Rasch
Rosita Scoones

35 years

Craig Armstrong
Melvyn Block
Donna Bogdan
Robert Bovee
Jerry Chancey
Aubrey Davault
Gregg Dillard
Grant Erickson
Kathleen Fannin
Dallas Ferguson
Ronn Frank
Bruce Heather
Marvin Helseth
Ilene Horton
Richard Iverson
Craig Jacobsen
Gregory Kallhoff
Donna Kimbrough
Susan Learned
Rodger Liggins
John Longnecker
Benjamin Matuliewich
Clyde McElrath
John McPherson
Anna Moen
Richard Moran
Janet Overman
Roy Rowland
Edward Rudolph
John Russell
Luis Salinas
Mohammed Sheikh
David Snuggerud
Wayne Snyder
James Strong
Nancy Thompson-
Culberson
Gary Thorsteinson

Fred Tucker
Thomas Ward
Peter White
Leslie Yoshimoto

30 years

Joseph Adamo
Joseph Aernie
Linda Alexander
Margaret Allen
Keith Amundson
David Armstrong
Jamie Baker
Marie Baker
Patrick Baker
Douglas Baldwin
Winona Bannon
Paul Barco
Michael Barilleaux
Earl Bartley
Phillip Beal
Theresa Beal
Robert Beden
Jon Bellah
James Berg
Billy Berryhill
Robert Betenson
Jeffrey Bianchi
Cindy Bingham
Freddie Blueitt
David Bolser
Brian Bolton
Jon Bonime
Madelaine Boothby
Joseph Boulanger
Nancy Brasfield
Patricia Brusso
Mark Burgess
Mark Button
Wayne Callan
Bud Canter
Frank Capece
Jose Cariaso
Rosa Caro
Mark Carter
Brenda Cash
Debra Cervelle
Jean Chamberlin
Jeffery Chappell
Gregory Chew
Annemieke Chorlton-
Vos
Richard Claridge
Roderick Clark
Howard Clay
Michael Conaway
Ronald Conradi
David Correa
Michael Courtier
Latifah Crawford
Patricia Cronin
Steven Culp
Randy De La O
John Deboo
John Dechaene
Jeffrey Deckelbaum

Raymond Del Toro
Gary Detie
Graziella Di Gennaro
Christine Dillinger
William Dobiash
Susan Drumm
Frank Eckelmann
Thomas Edin
John Ellmore
Charles Emunson
Elena Enano
David Evans
Evelyn Eves
Matthew Fanegan
Christopher Farmer
Robert Farnan
Mark Felling
James Fong
Terry Fox
James Foy
Wayne Franklin
Michael Frazier
Kathleen Frederick
Scott Freeman
Steven Fritts
Marsha Froehlich
Morel Furman
Luther Gammon
William Gannon
John Geiger
Martin Gibbins
Eleen Good
Gary Grandidier
Julie Grant-Meyer
Walter Greer
Roger Greminger
Carolyn Grimes
Suzette Grimm
Randall Groves
Stephen Guhl
Steven Guarido
David Guy
Steve Hall
Phillip Halverson
Ronald Halvorsen
David Hans
Kim Hansen
Michelle Hansen
James Hardersen
Benjamin Hargrave
Sandra Harleman
Melody Harrison
Felix Hart
Terry Hawthorne
Roger Hayden
Bonnie Haynie
Paul Heasly
Mike Hebert
Roger Hesse
Gene Hicks
Kevin Himka
Donald Hingst
William Hlavacek
Barry Hollander
Sun Hong
William Hook

James Hoskins
Terrance Hostak
James Houle
James Howie
Paul Hubenet
David Hunt
Richard Husom
Eileen Irons
Cathlene Jacobson
William Jaeckel
Dale Johnson
Helen Johnson
Karen Johnson
Peter Johnson
Woodrow Johnson
Sharon Jorgensen
Renee Joy
Corey Kartes
Susan Kelley
Jeffery Kenoyer
Toufic Khaouly
David Kilborn
Jerry Kiltz
Cheryl Kimball
John Kivitz
Susan Klingberg
Rifat Kocal
Thomas Koehler
Steven Kramer
Susan Larson
Victoria Larson
Samara Lau
Raymond Laukat
Diane Linthicum
Steven Low
Daniel Lucas
Diane Lynch
Preston Lyon
Michael Maillard
Barbara Martin
Daniel Martin
Michael Martorell
Thomas Massimino
Michael Mayes
Michael Mc Crea
Kenneth McCord
Madonna McCoy
Mary McCoy
Christina McWade
John Medley
Donald Meyer
Thomas Minniear
Tina Mireles
James Mitchell
Jesse Mocerro
Joseph Mooney
Therese Morehead
Ralph Moslener
Kelly Murphy
Vennie Murphy
Paul Myer
Debra Nelson
Philip Nguyen
Richard Nurell
Francis O'Hara
Lorna Osborne

Gary Pahl
Ronald Palikij
Martin Paph
Paul Pasquier
Earl Patterson
Douglas Perry
Ronald Pilo
Barbara Pohle
Debra Polack
Larry Poston
David Pressley
Jeffrey Presteen
Timothy Price
Pamela Prince
Kim Puglisi
Richard Putnam
Linda Rackleff
Jeffrey Ray
Robin Raymond
Helen Raysbrook
Douglas Reed
William Reese
Robert Reichle
Robert Reimers
Donna Ridout
William Rieg
Christina Ritland
Ronald Robinson
Michael Rootz
Donald Roy
Terry Roznos
Dianne Russell
Richard Russo
Bart Ryan
Douglas Sandberg
Richard Savage
Scott Schroer
James Seese
Julie Shafer
Gary Shamp
John Shields
Paul Shirron
Lilia Smith
Theodore Soriano
Wichai Sorod
James Stack
Timothy Stensen
Ronald Stephenson
David Stiehl
Patrick Stotts
Gene Stubbs
Renee Stueber
Scott Summervill
Norman Sutherland
Norvella Swan
James Tabet
Christopher Taji
Shunsuke Takano
Margarita Tello
Gregory Terry
Michael Tessier
James Testin
Raymond Thesenvitz
Michael Thompson
Helen Torgeson
Terry Trainor

William Trueman
Steven Trupiano
Cynthia Tullis
Terry Tyler
David Ujiye
Clara Ulibarri
Alan Ullman
Susan Valencia
Maria Valle
Stanley Van
Ralph Van Dyk
Sharon Volk
Gates Von Briesen
Michael Wagner
Wayne Walker
Dennis Wallace
Carl Waltenburg
David Washington
Julie Watson
Kathleen Watts
Reginia Webb
Joseph Weber
Randy Weber
Gladys Wehland
Paul Wehrle
Carl Weinen
Kathy White
Margaret Whitlock
Robert Whittington
Terry Wigley
Klair Wilks-Lowrey
Michael Williams
Frank Williamson
David Wilson
Richard Wilson
Donald Wilt
Kathryn Wood
Michael Wynn
Oktay Yesil

25 years

Kathleen Abts
Annette Ackerson
Lynnette Ackert
James Adams
Lori Adams
Vickie Adams
Mary Aguilar
Alfredo Alegado
Kerry Andersen
Jon Anderson
Donna Ankerfelt
Lonnie Antwiler
Carol Arens
John Ariano
Diane Ascani
Terry Ashley
Ronald Auman
Hallie Backes
James Banas
James Bangart
Christopher Barkley
Ronald Barron
Jeffery Barth
Ross Beard
Philip Bebbington

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

Karen Behring
 Forouzan Behzadpour
 Robert Bell
 James Belt
 Francis Bergman
 Paul Bergman
 John Bernatt
 Rouleen Billinger
 Gerald Bjornson
 John Blackhart
 Robert Blakeley
 Mark Boberg
 Barbara Bodker
 James Boggs
 Charles Borda
 Susan Boyle
 Betty Brandon
 Karen Branson
 Joseph Braun
 Bryan Bredberg
 Malcolm Bright
 Robert Broeker
 Jeffrey Brooks
 Gregory Brown
 Sylvia Brown
 David Buendia
 Paul Bureau
 Mark Burmeister
 Robert Burton
 John Cable
 Michael Cadigan
 Lauralie Campbell
 Steven Capatch
 Diane Carr
 Brad Cecil
 Scott Cecile
 Paul Chambers
 John Clemens
 Michael Colbert
 Stephen Conforti
 Philip Cook
 Robert Cooke
 Philip Corey
 John Criner
 Christopher Curd
 Robin Curtis
 Edward Cvrkel
 Pamela Dandridge
 Dale Davis
 Michael Davis
 Virginia Dearing
 Michael Depew
 Wade Diamond
 Durand Doi
 Patrick Dolan
 Raija Dorrity
 George Doyle
 Daiva Dulskis
 Linda Dulworth
 Roger Dulworth
 Alex Dunphy
 Darla Ebert
 Wayne Ellsworth
 Lawrence Escobedo
 Kenneth Evans
 Jack Ezraty

Eric Falangas
 Russell Field
 Thomas Finley
 Kent Fisher
 Douglas Fletcher
 David Fowler
 Georges Francoeur
 Robert Freeland
 Sheau-Wei Fu
 Christopher Funke
 Richard Gallow
 Richard Gasser
 Keith Gettis
 Faramarz Ghoddoussi
 Wayne Gibbs
 James Gibson
 Jon Gibson
 William Giese
 Glen Gieske
 Jerald Gifford
 Ronald Gilbert
 Carl Girardin
 Brant Goble
 Wesley Goble
 Glen Godwin
 Timothy Godwin
 Gregory Goff
 Jeffrey Goldstone
 John Grebliunas
 Arthur Green
 Thomas Green
 James Greenwell
 Peter Grigonis
 Roland Haberler
 Patrick Hailstone
 Paul Halstead
 Alan Halvorson
 Jerry Hand
 Katrina Hanna
 Kevin Hannan
 Timothy Hanson
 Susan Harber
 Kenneth Hardigree
 Adrienne Harris
 Alice Harter
 Wyman Henckel
 Craig Henderson
 Kevin Hennick
 James Henshall
 Harold Herren
 Donna Higgins
 Judy Hines
 Ronald Hipwell
 James Hladun
 Sean Ho
 James Hodge
 Dale Holliday
 Yang Hua
 John Hunt
 Sherry Hunt
 Charlene Hunter
 Toi Huynh
 Thomas Ingebretson
 Duane Innes
 Randy Jacobson
 Michelle Jarzabek

Robert Jensen
 Anthony Johnson
 Brian Johnson
 Carl Johnson
 Herbert Johnson
 Rick Johnson
 Denise Johnston
 Ilene Jones
 John Jones
 Thomas Jones
 Gilbert Joynt
 James Kabaci
 Joanne Kaneda
 Don Kefer
 Henry Kellner
 Wayne Kerley
 Kurtis Kilmury
 Robert Kimble
 Douglas Kirk
 Ross Kness
 Leo Kniestedt
 Alanna Kulshiski
 Keith Kurtz
 Daniel Lafferty
 William LaFollette
 Terry Laird
 Richard Lamas
 Robin Lazar
 Patrick Leahy
 John Lemay
 Joan Lenker
 John Leonard
 William Levacy
 Steven Lieberg
 Eugene Lim
 Carolyn Linstead
 Jeff Lister
 Frank Litwiler
 Peter Lo
 Tyron Long
 Wade Lord
 Jeffrey Lorenz
 Colleen Ludden
 Charles Lundstrom
 Pamela Mabry
 Ruben Macaraig
 Timothy Madison
 Sujith Mally
 Antoine Malone
 Warren Maloney
 Debra Marlenee
 Quin Marston
 Rosemary Martin-Spratt
 Jon Matsumiya
 David McBride
 Francie McCleerey
 Timothy McCrary
 Norman McDonnell
 Robert McFee
 Shirley McLaughlin
 Ruben Medrano
 Michael Mellen
 Rudy Mendoza
 Mark Menear
 Jacob Mesick

Denise Meyer
 Dean Miller
 Robert Miller
 Michael Mills
 Wayne Mitchell
 Mary Mohr
 Ricardo Molina
 Patricia Monaco
 Brad Montgomery
 Grant Moody
 Larry Moody
 Steven Mottl
 Richard Mullins
 Charles Murphy
 Susan Myers
 Donald Myron
 Gary Nakaji
 David Nelson
 Richard Nelson
 Eric Nesbitt
 Steven Newton
 Huu Nguyen
 Minh Nguyen
 Tuan Nguyen
 Barbara Nielsen
 Rodney Nielsen
 Timothy Nielsen
 Dana Noyes
 Kevin O'Brien
 James O'Farrell
 Steve Ohlmer
 Chris Okussick
 Steven Olfs
 Denise Olsen
 Richard Olson
 Deepak Om
 Sergio Ontiveros
 Gary Osborne
 Steven Oster
 Scott Palhidai
 Dennis Panado
 Brian Park
 Robert Parsons
 Albert Pastores
 Ghanshyam Patel
 Lester Patterson
 Samuel Patton
 Wayne Paulsen
 James Pelger
 Kevin Pennington
 Estella Perez
 Mary Pham
 Paul Pham
 Sanford Phillips
 Barton Pierce
 Keith Pisetta
 David Plechacek
 Keith Porter
 L.C. Price
 Thomas Pursel
 Edward Purvis
 Gregorio Quintana
 Daniel Rahkonen
 Vaho Rebassoo
 Elizabeth Reed
 Stephen Reese

Steven Rice
 Robin Richardson
 Taewon Ro
 Frank Roberts
 John Roberts
 Brian Robertson
 Mark Robertson
 Tara Robinson
 Michael Rockamore
 James Rohrs
 Russell Rowlee
 Gloria Rubio
 Richard Rupprecht
 James Rush
 Theodore Rutkowski
 Joseph Ryan
 Rey Salamera
 Marc Sanche
 Patricia Sandoval
 Michael Sawyer
 Teresa Scherr
 Connie Schormann
 Charles Schott
 Katherine Schwarzmann
 Dennis Scifert
 J.C. Sebastian
 Ralph Seyer
 Steven Sharp
 Thomas Shaw
 Michael Shell
 James Shemwell
 Terry Shoulders
 Sharon Simonsen
 Patricia Smith
 Peter Smith
 Michael Snow
 Virgil Snyder
 Mauricio Solis
 Joseph Spells
 Douglas Spohn
 George Sprinkle
 Frank Stanavitch
 Brent Stenseth
 Williams Stiteler
 Lucille Stroud
 David Sul
 Duane Summers
 Michael Sundquist
 Joseph Tackenberg
 Mark Taylor
 Douglas Tercy
 Keith Ternes
 Steven Thomas
 Leroy Tice
 Gregg Tiemann
 Todd Tiffany
 Shorlette Timberlake
 Paul To
 Gregory Toth
 Loc Tram
 Chuong Tran
 Bret Tyrey
 Kerin Ulibarri
 James Ure
 Roger VonJouanne

Sandra Walimaa
 Alvin Wallace
 Seraphine Wang
 David Warren
 Jimmy Watkins
 Richard Webb
 Jodi Welliver
 Gary Werner
 Curtis Wertz
 Jay Wieggers
 Stacia Wilkerson
 Marcia Willett
 David Williams
 Scott Wilton
 Robin Wood
 Robin Yarbrough
 Gerould Young
 Robert Young
 Stephen Young
 Kurt Youngs
 Vigen Yousefian
 Brian Zartner

RETIREMENTS: The following employees retired in September from The Boeing Company.

Sandra Ainsworth-Johnson, 19 years
 Donald Akers, 7 years
 Thomas Allan, 41 years
 William Allgaier, 15 years
 John Almazan, 9 years
 Charles Anderson, 36 years
 Carletta Barnes, 18 years
 Vincent Bartram, 40 years
 Timothy Billesbach, 9 years
 Mary Bjustrom, 27 years
 Thomas Blaisdell, 31 years
 Cynthia Blessing, 21 years
 Steven Bolton, 29 years
 Michelle Bowers, 27 years
 Billy Boyd, 32 years
 James Boyd, 33 years
 Ann Branch, 32 years
 Patricia Brent, 29 years
 Kenneth Bridgeman, 23 years
 Alan Brockmeier, 18 years
 Edward Brownell, 32 years
 Paul Butler, 23 years
 Sharron Callaghan, 19 years
 Robert Cappel, 20 years
 George Cardea, 13 years
 Bruce Carter, 18 years
 William Cassidy, 15 years
 John Coates, 12 years
 Randall Collins, 30 years
 Christel Cone, 22 years
 Norman Conner, 27 years
 Robert Courtade, 30 years
 Jon Courtright, 27 years
 Johnny Culberson, 11 years
 Ronald Dahl, 36 years
 Patrick Damaso, 31 years
 Paula Dickey, 9 years
 Jay Dimond, 21 years
 Charles Doughty, 43 years
 Jeffery Erickson, 32 years
 Gregory Farmer, 24 years
 Tracy Farwell, 31 years
 Sharon Fetters, 7 years

Victor Finazzo, 32 years
 James Floyd, 41 years
 Richard Frady, 30 years
 Craig Francque, 32 years
 Shirley Gamble, 16 years
 Russell Gaspari, 32 years
 Christopher Gorrell, 32 years
 Susan Greene, 28 years
 Michael Greenfield, 26 years
 Darin Groll, 42 years
 Rita Guardado, 43 years
 Deanna Guerrero, 33 years
 Ronald Harris, 24 years
 Lorin Hawkins, 37 years
 Robert Henson, 30 years
 Justin Holland, 19 years
 Faith Houck, 31 years
 Edward Houston, 4 years
 Philip Howie, 39 years
 Yann-Fu Hsu, 20 years
 Peter Huebner, 43 years
 Mary Huis, 27 years
 Michael Ingraham, 16 years
 Richard Ingram, 33 years
 Suzanne Ingram, 29 years
 Betty Isom, 19 years
 Robert Jenkins, 29 years
 James Johnson, 32 years
 William Johnson, 27 years
 Celia Jones, 10 years
 Ralph Jorstad, 40 years
 Nancy Keeler-Scott, 4 years
 Eva Kick, 28 years
 Edwin Kilby, 18 years
 Perry Knight, 22 years
 Susan Krzyzewski, 30 years
 Richard Kyle, 44 years
 Janet Langdon-Murphy, 22 years
 Charles Lau, 28 years
 Marion Lauck, 56 years
 Donald Lehman, 16 years
 James Leighton, 36 years
 Jeff Leonard, 18 years
 Gail Lepkosky, 29 years

William Linton, 12 years
 Gary Little, 12 years
 Leon Long, 31 years
 Rodney Loudin, 28 years
 Theodore Ludgate, 30 years
 Lois Maes, 27 years
 Joseph Malnar, 28 years
 Vincent Marcus, 33 years
 Evette McCree, 25 years
 Thomas McDonnell, 29 years
 John McGinn, 18 years
 Edgar Meeks, 31 years
 Mary Mendoza, 44 years
 Jerry Miller, 23 years
 Jerry Mitchell, 23 years
 Robert Monteiro, 31 years
 Robert Morris, 41 years
 Joseph Morrison, 43 years
 Alan Mortlock, 24 years
 Carol Mullins, 25 years
 Marvin Murray, 33 years
 Thomas Murray, 24 years
 John Nachbor, 32 years
 Hiromi Nara, 22 years
 Ronald Nesheim, 25 years
 Lon Nordeen, 30 years
 Reginald Nunn, 25 years
 John Oakes, 30 years
 Randy Obrezar, 30 years
 Kenneth Oburg, 25 years
 Clark Odekirk, 29 years
 Carl Olszewski, 47 years
 Esther Ossinger, 18 years
 Hui Pang, 24 years
 Mary Patino, 33 years
 Daniel Pemble, 40 years
 James Phillips, 44 years
 Richard Pierce, 35 years
 Frank Pislau, 28 years
 Stephen Premel, 30 years
 John Pulsipher, 24 years
 Maria Rivera, 14 years
 Phyllis Rodgers-Banks, 30 years
 Philmore Roff, 27 years

Jose Rosas, 23 years
 David Rosenthal, 40 years
 Tyson Runnels, 23 years
 Larry Sanders, 28 years
 Raji Sayegh, 28 years
 Richard Schleh, 29 years
 Kenneth Schmalbeck, 33 years
 William Schnicke, 18 years
 Bonnie Schulz, 23 years
 Paulette Scott, 43 years
 Patrick Scribner, 33 years
 William Shell, 30 years
 Donald Shickle, 21 years
 Ruth Shoup, 22 years
 Leslie Shrum, 5 years
 Joseph Simpson, 10 years
 Kenney Smith, 3 years
 Charles Spear, 11 years
 Terence Stamp, 28 years
 Richard Steckel, 24 years
 Carolanne Steinbach, 22 years
 Patsy Stephenson, 40 years
 Sharon Stevens, 31 years
 Norma Sykes, 32 years
 Iris Taylor, 11 years
 Jeffrey Thomas, 13 years
 Dannie Thrailkill, 22 years
 Carole Tostenson, 45 years
 Stephen Treadway, 22 years
 John Valovich, 19 years
 Martin Voss, 32 years
 Patricia Wagener, 21 years
 Stephen Wahl, 30 years
 John Wang, 29 years
 Lawrence Watson, 30 years
 Mona Whittington, 7 years
 Armond Wilhite, 29 years
 Robert Wilson, 30 years
 Christa Wolfe, 19 years
 Nancy Yarges, 12 years
 James Zerbe, 40 years

IN MEMORIAM:

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

Simon Desantiago, facilities plant maintenance specialist; service date Oct. 16, 1989; died Oct. 12

Kenneth Edwards, software engineer; service date June 17, 1991; died Oct. 11

Polly Green, system design and integration specialist; service date June 12, 2001; died Oct. 6

Charles Grundmann, numerical control programmer; service date Oct. 1, 1984; died Sept. 20

Keith Hamling, test and evaluation engineer; service date June 15, 1994; died Oct. 13

David Hanby, production coordinator; service date Aug. 6, 1996; died Oct. 15

Steve Harvey, fabrication specialist; service date Feb. 16, 1988; died Oct. 15

Perry Holcomb, field service representative; service date Aug. 27, 2004; died Oct. 12

IN MEMORIAM:

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

Jeffrey Larrick, test and evaluation engineering manager; service date Feb. 3, 1969; died Sept. 20

Scott Larsen, manufacturing manager; service date Nov. 9, 1978; died Sept. 19

Ravy Long, integral fuel cell sealer; service date June 8, 2007; died Sept. 16

Judy Lunsford, staff analyst, service date Nov. 6, 1983; died Oct. 16

Joyce Nagy, supply chain specialist; service date May 3, 1986; died Sept. 24

Kirit Patel, structural analysis engineer; service date Jan. 21, 1987; died Oct. 3

Dennis Peterson, technical designer; service date Sept. 22, 1978; died Sept. 29

Douglas Potter, engineer; service date March 6, 1980; died Oct. 15

Douglas Rowe, programmer analyst; service date March 30, 1982; died Oct. 7

Ewald Schoemig, systems engineer; service date May 9, 2001; died Oct. 10

Glen Scott, procurement cost analyst; service date May 12, 1980; died Oct. 7

Frank Smith, electronic technical maintenance facilitator; service date Nov. 10, 1987; died Sept. 23

Scott Smith, computing architect; service date Feb. 4, 1979; died Sept. 12

Thomas Steinert, manufacturing manager; service date Feb. 2, 1970; died Oct. 14

Joseph Taminich, manufacturing planner; service date May 21, 1992; died Oct. 2

Dewey Thompson, technical illustrator; service date April 2, 2004; died Sept. 29

Norman Turner, systems engineer support analyst; service date Dec. 16, 1987; died Oct. 4

Mary Valenti, administrative assistant; service date Nov. 4, 1976; died Oct. 15

Terry White, security officer; service date April 15, 2005; died Sept. 27

Around Boeing



PHOTO: KLM has operated many Boeing and Douglas models, including the 777-300ER (Extended Range) shown here. **TIM STAKE/BOEING**

A ROYAL TRIBUTE: BOEING AND KLM CELEBRATE AIRLINE'S 90TH ANNIVERSARY

Last month, Boeing joined KLM Royal Dutch Airlines to mark the carrier's 90th anniversary. More than 30,000 KLM employees, retirees and family members attended the airline's open house event in Amsterdam, where Boeing hosted an exhibit. Boeing also ran a special advertisement in *De Telegraaf*, the Netherlands' largest newspaper, celebrating the companies' shared history. KLM has operated many Boeing models, starting with the DC-2 in 1934, and received its fourth 777-300ER (Extended Range) in August. KLM is the oldest airline to operate under its original name.

BOEING SHANGHAI AVIATION SERVICES CELEBRATES HANGAR OPENING

Boeing Shanghai Aviation Services last month officially opened its new two-bay hangar at Shanghai Pudong Airport. Boeing Shanghai maintains and modifies Next-Generation 737s for regional and international airlines as well as domestic Chinese airlines.

"Boeing Shanghai's increasing capabilities will provide our Chinese airline customers and the international market with the services that will help them expand safely and efficiently," said Lou Mancini, senior vice president, Commercial Aviation Services, Boeing Commercial Airplanes.



FAST GUN

The Boeing AH-6i light attack/reconnaissance helicopter will be on display and conduct demonstration flights at this month's Dubai Air Show in the United Arab Emirates. The inaugural flight of the AH-6i was Sept. 16, seven months after work started on the prototype. Based on a combat-proven platform with a heritage of successful service with Special Operations forces, the AH-6i features a newly designed cockpit with dual 10.4-inch flat-panel displays, engine display, caution warning display and

standby flight instrument system—all compatible for use with night vision goggles. It has an electro-optic/infrared sight and targeting system; the weapons suite includes the Hellfire missile, all varieties of 2.75-inch (70-millimeter) rockets, 7.62mm mini-guns and the GAU-19 .50-caliber Gatling gun. The AH-6 platform also meets the requirements of the U.S. Army's new Armed Aerial Scout program and will be available in an unmanned or optionally manned version. BOB FERGUSON/BOEING



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& Flight Services**
ON TIME

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Our new name reflects an expanded portfolio of services. Now, in addition to pilot, maintenance and cabin safety training, customers can count on us for everything from flight operations and safety analysis to customized flight/dispatch documentation and operational consulting. So you see, Boeing Training & Flight Services is more than a new name.

It's a brand new day.

 **BOEING**

This ad helps build awareness of the new Boeing Training & Flight Services organization, formerly known as Alteon. The name change reflects the organization's expanded portfolio, which extends beyond the core training business associated with the Alteon brand. The ad will run in commercial aviation trade publications around the globe.



TOGETHER WE FLY HIGHER.

Ready for take-off? Thanks to our British partnerships, more UK Chinooks are ready than ever before. Our Through Life Customer Support (TLCS) programme provides maintenance and engineering support for Britain's Chinook fleet, setting a benchmark for future MoD sustainment contracts.

Together, we're taking logistics to new heights.

Discover more at boeing.co.uk/together



"London Eye" is the second in a series of ads reinforcing Boeing's partnership with the United Kingdom. Boeing is the largest overseas customer of the UK aerospace industry and partners with more than 300 businesses and universities around the country. The campaign complements Boeing business and communications activities in the UK. The ad will run in The Sunday Times, The Economist UK, and House Magazine as well as four other UK publications.