

 **BOEING**

Frontiers

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DREAM DEBUT

The 787 Dreamliner arrives in Japan,
ready to serve



LOGISTICS SUPPORT THAT'S ALL SYSTEMS GO.

Performance-Based Logistics (PBL) are an effective solution in improving military readiness while saving billions. Under Boeing PBL programs, C-17 flying hour costs have been reduced by 26% since 2004, while the F/A-18 Super Hornet has exceeded readiness targets by 17.5% and the Apache Longbow by 19.3%. An AIA study estimates PBL savings to be \$25-\$30 billion per year. That's performance we can't afford to lose.



On the Cover

20 Ready to serve

With delivery fast approaching to launch customer ANA (All Nippon Airways), the Dreamliner made its first visit to Japan last month in preparation for when it will be carrying airline passengers. A weeklong series of service-ready proving flights simulated daily airline operations and allowed for checks of ground equipment at five airports. The 787 was greeted like a rock star wherever it went. This *Frontiers* photo essay captures the excitement that surrounded the 787's Japan debut.

COVER IMAGE: AFTER A NONSTOP FLIGHT FROM SEATTLE, A 787 DREAMLINER IN ANA LIVERY WAS GREETED BY MORE THAN 1,000 PEOPLE, INCLUDING MEDIA, ANA EMPLOYEES AND AVIATION ENTHUSIASTS, WHEN IT LANDED JULY 3 AT HANEDA AIRPORT IN TOKYO. BOB FERGUSON/BOEING

PHOTO: MOUNT FUJI IS VISIBLE IN THE DISTANCE DURING ONE OF THE 787'S ROUTE-PROVING FLIGHTS IN JAPAN. BOB FERGUSON/BOEING



Ad watch

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

Inside cover:



One of three new ads featuring Boeing's Performance Based Logistics capabilities, this ad highlights the success of the PBL program in supporting the C-17, reducing cost while increasing readiness for the military customer.

The campaign is running in military, trade and congressional publications.

Page 6:



This ad highlights the pressing need for air traffic management (ATM) transformation and positions Boeing as a leading advocate and integral contributor in the development of a global ATM system. The ad is running in ATM-

focused publications such as *Airspace*, *Air Traffic Management* and *Jane's Air Traffic Control*.

Back cover:



"787" is part of a series of ads that reinforces Boeing's partnership with Japan, a relationship that began more than 50 years ago.

The campaign features the art of calligraphy, a symbolic tradition of Japanese culture that

communicates not only words but a deeper and richer meaning.



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Heading into World War II, competitors Boeing and Douglas collaborated on the mass production of much-needed bombers for the Allies. They subsequently teamed with Vega Aircraft, a subsidiary of Lockheed, to produce later models of the B-17. This working-together effort produced amazing results and underscores what can be accomplished today by the "One Boeing" team.

PHOTO: BOEING ARCHIVES



13 Teaching that's miles above

Ninety-two educators from 11 countries "launched" off to camp last month for an adventure that included a virtual walk on the moon using a one-sixth gravity device. Welcome to space camp in Huntsville, Ala. The Boeing-sponsored activities were aimed at helping teachers inspire their students to study math, science and technology. The five-day camp marked the 20th anniversary of the Boeing space camp program.

PHOTO: ERIC SHINDELBOWER/BOEING



32 Lives on the line

Whether ensuring parachutes have been correctly packed or double-checking helmets and crew safety gear, the Flight Operations Life Support team with Boeing Test & Evaluation helps keep aircrews safe. The team also provides training in aircraft rescue and firefighting.

PHOTO: RICH RAU/BOEING



36 Epic journey

From the supply line to the assembly line, Commercial Airplanes employees have embarked on a historic increase in jetliner production—when they're already building planes at unprecedented rates. For the first time, Boeing is raising production rates for all five of its jetliner models. It's a huge undertaking.

PHOTO: BOB FERGUSON/BOEING



40 Code for success

It may have an unwieldy name: SOSCOE, short for System of Systems Common Operating Environment. But this universal translator for computer language, developed by Boeing software engineers so existing U.S. Army computer systems can work seamlessly with new tools and electronics, is quickly finding applications outside Boeing's military customer base.

PHOTO: RICH RAU/BOEING

INSIDE

07 Leadership Message

What will drive Boeing's future success? Personal accountability, a commitment to excellence, innovating, finding new ways of doing business, developing skills and setting clear expectations, says Dennis Muilenburg, president and CEO of Boeing Defense, Space & Security.

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CORRECTION

Page 36 of the July 2011 issue of *Frontiers* misstated the name of the Boeing heritage company that was awarded a \$60 million development contract as the prime contractor for the Harpoon missile system. The name is McDonnell Douglas Astronautics.

Pursuit of excellence

Boeing at its best is tough to beat in the competitive global marketplace

When meeting with teammates, I always emphasize this point: The work we do matters. It matters because we support important customers and missions. We connect and protect people around the world. Our work directly affects global prosperity and national security. And it expands the boundaries of human exploration. We can never forget lives often depend on our products and services.

That responsibility inspires us and demands a sense of excellence in the tasks we do every day. But excellence doesn't apply only to the tasks themselves. It guides how we work, encompassing the best aspects of our workplace: innovation, open communication, investing in our people, commitment to quality, integrity, teamwork, character and leadership at all levels.

It also includes a "One Boeing" mindset. By nurturing collaboration and leveraging the enterprise, we are tough to beat in a challenging global marketplace.

The recent KC-46 tanker win proves that One Boeing gives us advantages no competitor can match. Our ability to offer innovation, global scale, and the right people and technology gave us the edge. And it provides a solid foundation as we set out to execute this important work.

And excellence demands personal accountability. Our success depends on each of us being responsible for understanding our strategy, setting clear expectations, developing skills, raising concerns, innovating, finding new ways of doing business, and living the Boeing values. We all have a stake in accelerating changes to drive growth and competitiveness and, ultimately, deliver for our customers.

Creating this engaging and invigorating workplace benefits not only Boeing and its shareholders but every employee and the communities where we operate. Above all, it enables us to offer enhanced and affordable capabilities to our customers—military and civilian—who depend on us.

Boeing recently supported the production of *Rescue*, an IMAX film that tells the story of military and civilian first responders who provide aid following disasters worldwide, including the earthquake in Haiti. These heroes—though they would deny



"We all have a stake in accelerating changes to drive growth and competitiveness and, ultimately, deliver for our customers."

— Dennis Muilenburg

President and CEO of Boeing Defense, Space & Security

PHOTO: RON BOOKOUT/BOEING

that description—provided care and comfort to men, women and children caught in the middle of disaster. And they did it using Boeing products—C-17 transports and CH-47 Chinook helicopters. (For more information on *Rescue* showtimes and locations, see www.rescue-film.com).

Last month, we had the privilege of working with our customers on the last space shuttle mission. As *Atlantis* landed, we shared a sense of pride in this historic milestone and Boeing's continuing contribution to stretching the boundaries of exploration.

These are just a couple of examples. If you ever find yourself at work wondering whether it's worth the extra effort to push for a process improvement, bring up a problem that needs attention, or help a co-worker complete a task, please reconsider. Men and women protecting our freedoms and flying rescue missions, airline pilots and passengers, astronauts, and soldiers on the ground are but a few of the many who are at the heart of every workplace decision we make.

Are they worth our extra effort? Worth everything we can do to make sure we continue to offer the high-quality, affordable products and services for which we're known?

Absolutely—that's Boeing, and that's what leadership is all about. ■

TRAFFIC JAM AHEAD. PLAN ACCORDINGLY.

Transforming the air traffic management (ATM) system is essential for improving safety, efficiency and the environment around the globe. Boeing is fully committed and uniquely qualified to help make ATM transformation a reality. It's the right time and Boeing is the right partner.





CAN'T WAIT FOR FREIGHT

Following a visit to the Paris Air Show in June, the 747-8 Freighter is shown at the Cargolux home base in Luxembourg, where more than 1,000 people, including Cargolux employees and their families, got an opportunity to walk through Boeing's biggest-ever 747. It flew to Luxembourg on the same blend of biofuel and traditional kerosene jet fuel that had powered its four engines on the flight to the air show from Everett, Wash. It marked the first trans-Atlantic flight of a commercial jetliner using biofuel, as well as the first where that fuel was fed to all engines. Cargolux is scheduled to take delivery this summer of the first 747-8 Freighter. PHOTO: RUDI BOIGELOT



MD
for success

Great service starts with dedicated employees *By Marcy Woodhull*

As a fleet support chief for Commercial Aviation Services in Long Beach, Calif., Ed Carter is the point person for questions from airlines about any issue they might be experiencing with DC-9 and MD-80 aircraft. In this *Frontiers* series that profiles employees talking about their job, Carter discusses why he is so passionate about meeting the needs of customers. PHOTO: PAUL PINNER/BOEING

Quotables

“Sometimes my English lacks the words to explain the thrill of flying that airplane.”

– Mike Carriker, 787 chief test pilot, after he and co-pilot Randy Neville landed at the Boeing South Carolina site in North Charleston from Europe following the Paris Air Show. Carriker and Neville flew the airplane for the first time on Dec. 15, 2009. In *Charleston Post and Courier*, June 28.

“They are potent fighting machines that give our air force an impressive strike capability.”

– Jason Clare, minister for Defence Materiel, who welcomed the arrival last month of three more Boeing F/A-18 Super Hornets to Royal Australian Air Force Base Amberley in Queensland. The RAAF now has 18 Super Hornets, with six more to be delivered this year. In *Flightglobal*, July 18.

The key to excellent customer service is getting to the root of what a customer is really asking for. It may not be as straightforward as we first think. Being able to understand exactly what a customer is asking for—and why—comes from experience and understanding your customer. Without that, we can't give our customers what they really need.

Airlines make an enormous commitment of money and resources in purchasing our airplanes and services. They demonstrate faith and trust in us, and we must return that with the best possible support—and do it in a professional, friendly and caring manner. We have a chance to share our Boeing values every time we interface with these customers.

As fleet support chief for Boeing heritage DC-9 and MD-80 aircraft, I manage technical and operational issues airlines have. The MD-80 is the workhorse of the American and Delta airline fleets, and these two carriers operate the bulk of my fleet, though our team supports airlines all over the world. The level of support Boeing provides for these older aircraft could affect decisions the airlines make when purchasing new fleets.

I attribute my success to having been a field service representative for 10 years. I spent five years in Germany, supporting Lufthansa, Aero Lloyd and others. As field service reps are colocated with airlines, I learned to look at support from the customers' perspective, and got a real appreciation for what's important to them.

When hundreds of MD-80s were grounded in the spring of 2008 to perform maintenance checks on wiring bundles, we worked 24 hours a day for almost a week to resolve the issues and safely get airplanes back in the air. That cemented an already very strong relationship we had with American and Delta.

Because of my involvement, I was appointed to the Federal Aviation Administration's Airworthiness Directive Aviation Rule-making Committee. I appreciate the opportunity to be on this committee and, along with other industry professionals, to implement solutions to enhance the Airworthiness Directive process. ■

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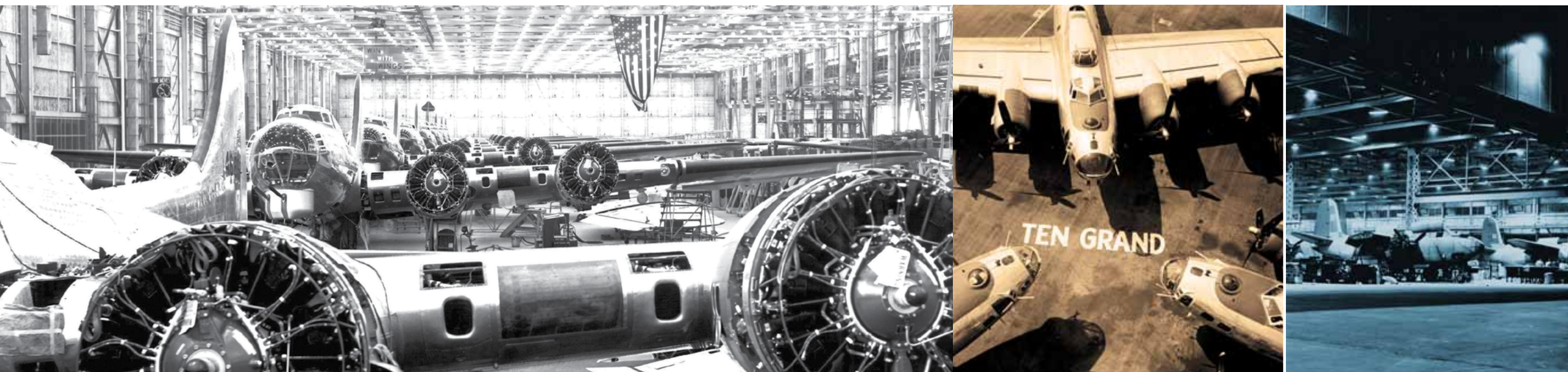
Past is prologue

In the early days of World War II, rivals Boeing and Douglas took a one-team approach to mass-produce combat aircraft

By Mike Lombardi

“The most significant example of the ability of the American aircraft industry to cooperate in the interest of national defense.”

– Douglas *Airview* magazine



It was 1940. Europe was at war.

The besieged Allies turned to aircraft manufacturers in the United States for desperately needed combat aircraft. Two companies, Boeing and Douglas, negotiated an agreement to work together on what the Douglas *Airview* magazine called “the most significant example of the ability of the American aircraft industry to cooperate in the interest of national defense.”

While the heritage of Boeing has a number of inspiring examples of working together, this one story stands out: When the Allies needed help for the war effort, two rival corporations broke down barriers to collaborate on the mass production of military airplanes.

At the time, U.S. President Franklin D.

Roosevelt’s “Arsenal of Democracy” was only beginning to gear up, and when Douglas received a request from the French government for nearly 500 attack airplanes, the capacity to build those planes was not yet available.

To fulfill the order, Douglas and Boeing negotiated their agreement.

In a joint statement in May 1940, Donald Douglas Sr., president of Douglas Aircraft, and Boeing President Philip Johnson announced that Boeing would manufacturer, under license, 240 Douglas DB-7s (similar to the A-20A built for the U.S. Army) at Boeing Plant 2 in Seattle. It would be part of a joint Boeing and Douglas effort to build 480 of the airplanes for France.

Johnson and Douglas expressed confidence in the production and license-sharing arrangement.

“The aircraft industry’s new opportunity to concentrate on a few advanced models in large quantities,” the companies said in a joint press release, “will give to the industry and to our national defense a great backlog of technical skill and resources, and will make it possible to build our own airplanes better, faster and more economically than we have in the past.”

Those words proved prophetic. The joint Boeing-Douglas DB-7 program became a forerunner of successful joint production programs that were widely used throughout the United States during World War II.

Boeing and Douglas followed up with an even more ambitious collaborative program, teaming with Vega Aircraft, a subsidiary of Lockheed, to mass-produce “F” and “G” models of the Boeing B-17 Flying Fortress.

The Boeing, Douglas, Vega Cooperative Production Committee was formed in May 1941 to manage three B-17 production lines—in Seattle and in Long Beach and Burbank, Calif.—as if they belonged to one corporation. The committee took on many responsibilities, including coordination of tooling, coordination of design and production changes, distribution of drawings, standardization of procedures, purchase of materials, and the management of subcontractors.

The complexity and size of this effort can be illustrated by the single task of coordinating subcontractors. Boeing had 250 in 80 different cities and Douglas and Vega added another 350 subcontractors. In many instances there were multiple subcontractors making similar parts that the committee had to ensure were 100 percent interchangeable.

Ultimately, the Boeing, Douglas, Vega Cooperative Production Committee accomplished the joint production of 12,085 B-17F and G Flying Fortresses in just three years.

It was a working-together effort by rival corporations that produced amazing results and helped win a global war. And it underscores all that can be accomplished

today by a “One Boeing” team, working together seamlessly to provide customers with the best products at the best value. ■

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PHOTOS: (From far left) Boeing B-17Gs assembled at the Douglas Aircraft plant in Long Beach, Calif; delivery of the 10,000th B-17 built since America’s entry into World War II was celebrated by bringing together an airplane built by Douglas in Long Beach, Calif., Boeing in Seattle and Vega (Lockheed) in Burbank, Calif; and Douglas DB-7s on the assembly line at Boeing Plant 2 in Seattle. BOEING ARCHIVES

Global excellence

Korean Air is a global airline leader—in both passenger service and freight

By Kevin Yoo

What air carrier has the distinction of being the first to order both the 747-8 Intercontinental and the 747-8 Freighter and will be the first to operate both the 777 Freighter and the 747-8 Freighter?

If you answered Korean Air, give yourself a pat on the back.

Korean Air is one of the world's leading carriers. Based in Seoul, Korea, the airline serves 114 cities in 39 countries and operates a fleet of 113 passenger airplanes, of which 81 are Boeing. Korean Air is also one of the founding partner airlines of the SkyTeam Alliance, the world's second-biggest airline alliance.

Korean Air is well-known as a leading global passenger airline, living up to its vision of "Excellence in Flight." It may not be so well known, however, as one of the freight industry's pre-eminent air cargo operations.

From 2004 to 2009, Korean Air Cargo was the world's largest air cargo operator, and this year it celebrates its 40th anniversary. Today, Korean Air Cargo operates an all-Boeing fleet of 24 747-400 freighters and is the largest cargo carrier between North America and Asia.

Korea's flag carrier has five 747-8 Inter-

continental passenger planes and seven freighters on order.

"Over the years, Boeing aircraft have played an instrumental role in helping us maintain our top-rated air cargo business," said Yang Ho Cho, chairman and CEO of Korean Air. "We look forward to continuing a long and rewarding partnership with Boeing."

This partnership already spans four decades, and it covers more than just commercial jetliners.

"Korean Air has steadily built its reputation as an early adopter of new technology and innovation, and Boeing airplanes have played an instrumental role in that strategy," said Marlin Dailey, vice president of Sales & Marketing for Commercial Airplanes. "We enjoy a unique relationship with Korean Air—both a customer and a supplier for Boeing—so our partnership is multifaceted and brings us closer on many levels."

Through its Aerospace Division, Korean Air supplies composite structures and components for Boeing's next generation of airplanes including the 787 Dreamliner and 747-8 programs, Dailey noted.

Korean Air was among the first airlines to order the 787 Dreamliner, as well as



The write stuff



Boeing-sponsored space camp inspires teachers to help their students explore new frontiers

By Patricia Soloveichik and photos by Eric Shindelbower

both variants of the 747-8. Through its aggressive acquisition of next-generation passenger airplanes, the airline aims to improve on its premium image and service.

This past spring Korean Air took delivery of its first Next-Generation 737-900ER (Extended Range). The 159-seat jet features the new Boeing Sky Interior and is also equipped with personal audio- and video-on-demand systems—a feature that can now be found standard on almost all of Korean Air's commercial airplanes.

And Korean Air has plenty to look forward to. Last month, South Korea won the bid to host the 2018 Winter Olympics. With delivery of Korean Air's first 787 expected ahead of those games, the Dreamliner will be ready to help carry future Olympians to realize their dreams. ■

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PHOTOS: (Above) Korean Air flight attendants showcase the video-on-demand in-flight entertainment system on the airline's Next-Generation 737-900ER (Extended Range). **KOREAN AIR (Below)** A new Korean Air 777-300ER takes off from Paine Field in Everett, Wash. **TIM STAKE/BOEING**



Immersed in rocket science, steeped in the drama of NASA history, then flipped, flung and dropped in a series of astronaut simulations, teachers from around the world left the Boeing-sponsored Space Academy for Educators program last month with a renewed appreciation for their role in extending new frontiers—both in education and space.

“Boeing has a great deal to be proud of in the history of the NASA space program, but the investment they are making in you today is about building the future of space exploration,” said Robert “Hoot” Gibson, describing the benefits that hands-on learning beyond the classroom can bring to teachers and their students. A longtime space shuttle pilot, Gibson addressed educators attending the 20th Boeing Space Academy. He was one of several speakers who briefed teachers about NASA endeavors, as well as the current state and future challenges of space exploration.

Hosted by the U.S. Space and Rocket Center in Huntsville, Ala., and sponsored by Boeing, the educators program is designed to inspire and help teachers engage students in science, technology, engineering and mathematics, or STEM. Teachers from 11 countries and 17 states were represented this year.

Space exploration still has the power to inspire kids to pursue the difficult coursework required of STEM curricula, said Rhonda Cox, a high school physics teacher from Illinois and summer instructor at the Boeing camp.

“Kids will just blow you away if you give them a chance,” Cox said. “You have to really challenge kids; they rarely disappoint your expectations.”

Many of the teachers attending the camp were looking for ways to connect kids to careers in engineering and technology by capturing their imagination.

“This is all so removed from our small island,” said Kimberly Kaai, from Molokai, Hawaii. “Being here will help me to bring those possibilities back to the students. I’ve heard directly from people who have done this and experienced some of it in the simulations, so I can share those experiences.”

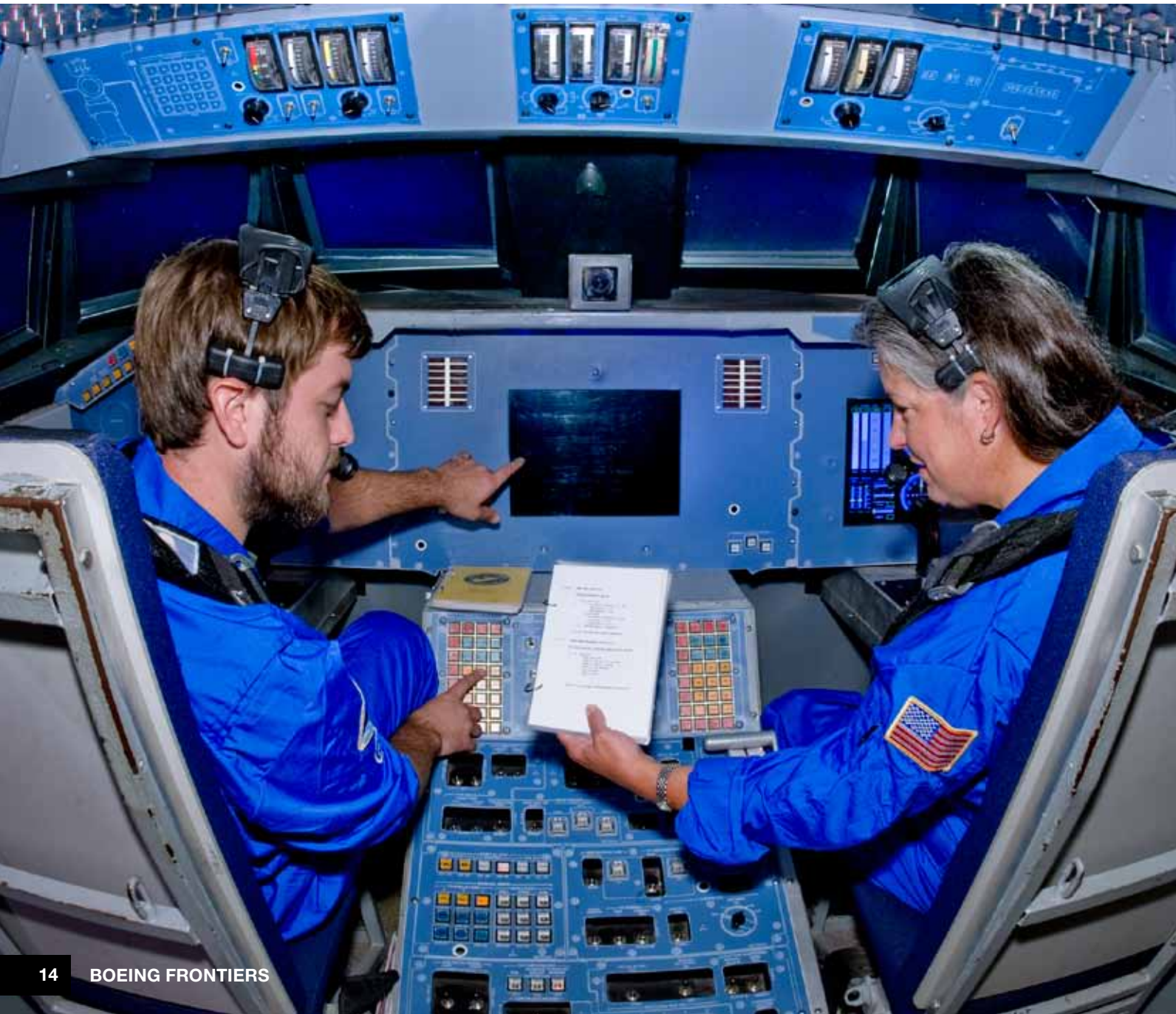
Students and teachers gathered before dawn on July 21 to watch the landing of Space Shuttle *Atlantis* and talked about having gained a greater appreciation for the complexity of the technology.

“There is so much speculation about the end of the shuttle program and what that means, but the kids are just as excited as ever because of all the talk about deep space exploration,” said Beth Keller, a Huntsville teacher. “That feels like their frontier.” ■

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PHOTOS: (Page 13) Sami Shehab from the United Arab Emirates is taken for a spin—one of the many simulations that help teachers better understand actual astronaut training through hands-on learning beyond the classroom. **(Inset)** Space camp instructor Rhonda Cox, a physics teacher from Illinois, helps a student simulate repair of a tile on the space shuttle as if in orbit.

(Pages 14–15, clockwise from far left) Branson Lawrence, left, of St. Louis acts as space shuttle mission commander with Huntsville, Ala., teacher Beth Keller as pilot; Shmuel Berman of Israel (foreground) closely monitors environmental controls during an *Atlantis* mission simulation as Laura Schmidt and Mike Avara, both from Illinois, work mission assignments; Kyutae Kim, left, of Seoul, South Korea, and Patrick Mangan of Oregon ready their rocket for launch; Vera Lucia Pereira, left, of Brazil builds a small structure with teammate Annie Keehn of Oklahoma, mimicking work outside an orbiting NASA spacecraft.



Safety 24/7

A new global health and safety system is helping Boeing sites further enhance workplace safety

By Patrick Summers

Boeing Salt Lake City faced an unusual challenge: how to continually improve workplace safety when the site's overall performance was already showing good progress. The site's 520 employees had two injuries that caused lost days from work in 2010.

"We had a low injury rate to begin with, but even one injury is one too many," said Todd Silva, manager of Environment, Health and Safety, at the Salt Lake City facility, which is part of Boeing Commercial Airplanes' Fabrication business unit.

In mid-2010, the site became the first Boeing manufacturing facility in the United States to embrace a new health and safety management system. The Occupational Health and Safety Assessment Series (OHSAS) 18001 is a globally recognized standard that uses common processes and tools to reduce the risk of workplace injury and illness, focus on continual safety and health improvement, and emphasize shared responsibility for workplace safety.

Todd Nelson, a machinist in Salt Lake City, leads a Safety Now employee involvement team and notes the site's already low rate of workplace injuries. "We want to keep heading in the right direction," he said, "and OHSAS 18001 will help us do that."

As part of Boeing's Safety Now effort to reduce workplace injuries, all major manufacturing sites will conform to the new safety management system by the end of 2011.

For Salt Lake City and other sites that have already adopted the new system, the

focus on continual improvement is helping to elevate safety practices to a new level of accomplishment.

"It makes you go through every aspect of your operations and identify and rank risks in a disciplined way," Silva explained. "When you take a step back and have an objective look, you can identify things that may not be causing problems today but will cause problems tomorrow."

Establishing a process for identifying and prioritizing safety risks is a major benefit of OHSAS 18001, according to Bryan Bauer, the senior Environment, Health and Safety specialist who is leading the system's deployment across the Boeing enterprise. "Boeing is very good at identifying and mitigating hazards," he said. "But OHSAS 18001—which adds a formal requirement and system to evaluate and rank the risk of a hazard occurring—helps us get to the next level. It helps an organization target its resources at reducing safety risks."

BDS Puget Sound became the first Boeing Defense, Space & Security site to achieve conformance with the new safety management system earlier this year. Operations Director Angela Hall said it is a valuable resource in the site's safety management.

"Our sites have had a robust safety system in place for a number of years and we're proud of our progress in improving workplace safety," she said. "OHSAS 18001 brings an emphasis on personal commitment and accountability for the system's success. Every employee is responsible and accountable for a safe

workplace. For me that's a very powerful message."

Rick Edwards, occupational health and safety specialist for BDS Puget Sound, agrees. "OHSAS 18001 essentially says safety is not a specialty niche concern; it needs to be an integral part of the organization," he said.

Hall credits the site's long-standing commitment to safety and the new system's tools for helping BDS Puget Sound reduce its lost workday case rate by more than 25 percent since the beginning of the year. The lost workday case rate measures workplace injuries that cause at least a day away from work.

Jennifer Rezmer, Environment, Health and Safety manager for BDS Puget Sound, appreciates the way the system emphasizes communications to help create a safer workplace. "It is helping us create a culture of openness where employees feel comfortable in bringing safety issues and questions forward." ■

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PHOTOS: (Left) Mill operator Todd Nelson, Fabrication, uses a lift-assist device. **BLAIR KUNZ & ASSOCIATES PHOTOGRAPHY LC (Inset)** 777 tool designer Patrick Franzen, kneeling, and team review ideas for safer tooling. **GAIL HANUSA/BOEING**

Signal strength

Argon ST brings critical communications intelligence capabilities to Boeing

By Richard Esposito

On a moonless night in the waters off Southern California, a team from a U.S. Coast Guard cutter is about to board and search a fishing trawler that's been suspiciously plying waters where there are no fish. It's an unpredictable situation, and that makes for dangerous work.

Fortunately, they are not going in blind.

The cutter is equipped with systems that not only detect radio-frequency emissions from other vessels but also help pinpoint specific signals from individual ships amid all the electromagnetic "noise" and traffic in busy near-shore waters.

Intelligence can be gleaned from within the signals. The trawler has been monitored for hours and the crew of the cutter has a clearer picture of who the people on this trawler are and what they might be expected to do. With this enhanced situational awareness comes an added measure of safety for crew members when they board the vessel.

The critical capability enabled by these systems is known as signals intelligence and it is a hallmark of Argon ST, which is now a wholly owned Boeing subsidiary and a division of Boeing Network & Space Systems. Argon was acquired by Boeing in August 2010.

"Our core capability is the exploitation of communications signals and the intelligence derived from those," explained Terry Collins, an Argon ST co-founder who today serves as vice president and general manager. "And the real difference between

that and all the other signals intelligence capabilities, such as exploiting radar or telemetry data, is that communications signals allow you to understand the content of what other people's intentions are, so they are a very high priority in the intelligence collection business."

Signals intelligence is part of a larger set of interrelated capabilities referred to as C4ISR—command, control, computers, communication, intelligence, surveillance and reconnaissance.

Argon ST is a longtime C4ISR supplier to the U.S. Navy and other U.S. military and intelligence customers. Other Argon ST products provide torpedo defense for the U.S. Navy and nearly two dozen other maritime partners around the world.

"One of the things we have brought to Boeing is a much larger presence with the Navy outside of naval aviation," Collins said. "Prior to the acquisition, Boeing didn't have much to do with the surface navy or the submarine navy. We have systems on all attack subs, well over 80 surface ships and 100 or so small platforms."

Argon ST's technical capabilities and customer base made it an attractive target for acquisition and the division promises to play a key role in Boeing Defense, Space & Security's goal to become a C4ISR market leader in the next few years, said Syd Blocher, a longtime Boeing mergers and acquisitions leader. He now heads up the Argon ST business development team.

"Argon ST was high on our list all along because it builds the sensors and software

architecture that we didn't have—the things you put on the platform that actually do the intelligence, surveillance and reconnaissance mission," Blocher said. "Mission equipment is a longer-term value stream. Airplanes will fly for generations, but the mission equipment is always being refreshed."

Becoming part of Boeing gave the smaller company vast new opportunities to "put sensors on airplanes"—both piloted and unmanned, said Argon ST Chief Engineer Stuart Ware. The acquisition also gave both companies something less tangible but critically important: the synergy that comes from combining two culturally similar organizations that share the same commitment to supporting their military customers' warfighting mission.

"The underlying cultures of Argon ST and Boeing are very compatible," said Jeff Brown, Argon ST's director for National Intelligence and Cyber Solutions.

Brown serves on a team of Boeing and Argon ST leaders who are shepherding Argon ST through a deliberately slow and patient integration into Boeing.

"Both companies do important work for the U.S. Department of Defense and the things we build go into combat, so we have an obligation to deliver products of excellent quality," Brown said. "We see in Boeing that same commitment to excellence, so we fit very well within Boeing." ■

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PHOTO: Training specialist Stephen Oliver adjusts a component of Argon ST's ship signals system. ARGON ST



PHOTO: Ship signals technology by Boeing subsidiary Argon ST is currently deployed on numerous U.S. Navy ships and submarines. U.S. NAVY



PHOTO: Production assembly technician Rod Guyton works on a submarine communications system. ARGON ST

夢のようなサービス Dream service

On its first trip to Japan, the 787 Dreamliner is put through its paces

by Lori Gunter and photos by Bob Ferguson

During the 787's historic visit to their country last month, a Japanese family drove more than three hours just to see the Dreamliner at the airport in Okayama, one of six airports on the 787's weeklong itinerary.

They were among several thousand people who lined up for hours at the airports for a look at the new Boeing jet that soon will be delivered to launch customer ANA (All Nippon Airways) of Japan.

But for this family, it was even more special. They got to meet the ANA pilots as well as Scott Fancher, vice president and general manager of the 787 program.

Later, the family waited for hours at the airport—while Boeing and ANA crews performed planned testing and demonstrations—so that they could also see the 787 leave.

Two days later, Fancher received a message from



PHOTOS: (Below) The sweep of the 787's wing during flight from Seattle to Tokyo. **(Insets)** After leaving Boeing Field (top left) with ANA pilots at the controls, the 787 was welcomed at Tokyo's Haneda Airport on July 3. An event the next day inside the ANA hangar included airline President and CEO Shinichiro Ito and Jim Albaugh, president and CEO of Commercial Airplanes (second photo from bottom left).

"The 787's wings are very beautiful ... like an angel."

— Kimiko Masuda after seeing the 787 Dreamliner in Okayama, one of several stops on its first visit to Japan.





PHOTOS: (Below) ANA employees inspect the empennage of the 787 outside the ANA hangar at Tokyo's Haneda Airport. **(Insets)** ANA employees at Haneda and Osaka's Kansai and Itami airports worked side by side with Boeing teammates as part of the 787's service ready operation validation, or SROV. The 787 also made similar stops at airports in Okayama and Hiroshima.

Kimiko Masuda, the mother of the family, who wrote:
 "July 7 was an amazing day for me. The 787's wings are very beautiful ... like an angel! It's very hard on me to go to OKJ (Okayama), but it made me happy very much! I love the Dreamliner!"
 The 787's trip to Japan represented a crucial step in preparing for first delivery, with a series of service-ready proving flights. It was an opportunity for Boeing and ANA crews to work together to test various airline operations before the Dreamliner goes into revenue service, such as towing procedures, ground support equipment and maintenance actions.
 But even though the 787 was essentially on a business trip, it was greeted like a rock star everywhere it went.
 "It's just the perfect example of the incredible support



and good will we received throughout the country," Fancher said of the reaction to the Dreamliner's visit. "People were excited to see us, to see the airplane and to recognize the role they are playing in this game-changing program."

That sentiment was echoed by Mike Fleming, vice president of Services for the 787 program.

"The people of Japan really came out in support of ANA, Boeing and the 787," Fleming said. "It was just amazing to see the people who waited to see landing and takeoff at every airport we visited."

During the 787's visit to Osaka, a line of fans wanting to see the 787 snaked around the terminal. Crowds stood four hours in the hot sun to see the Boeing jet.

"Unless you see it in person, it's hard to describe the



PHOTOS: (Below) The 787 as seen from the passenger terminal at Osaka Kansai International Airport, one of six airports the jetliner visited during its trip to Japan. **(Insets)** The weeklong visit to Japan helped ensure the 787 is ready for airline service and involved more than 150 Boeing employees and a similar number of ANA personnel.

genuine outpouring of emotion and excitement surrounding the 787 Dreamliner's first visit to Japan," Randy Tinseth, vice president of marketing for Commercial Airplanes, wrote in his online journal, of the reception the 787 received.

After the completion of the service ready operation validation program, or SROV, the 787 made a final stop in Nagoya, home of 787 partners Mitsubishi, Kawasaki and Fuji Heavy Industries. It was an opportunity for hundreds of Japanese workers who make the wings and other sections of the Dreamliner to see and walk through the airplane at Centrair Airport.

"Their hard work and support have been instrumental in getting us to where we are today," Fancher said.

Added Yasuhiro Toi, 787 program manager for Fuji Heavy



PHOTOS: (Below) At Haneda Airport, ANA maintenance personnel perform maintenance inspections on the 787 wing. **(Insets)** Ground and flight crews validated more than 100 procedures during the airport visits. These involved operations such as towing the 787 in and out of hangars, routine maintenance, and making sure ground equipment interfaced properly.





PHOTOS: (Below) At Centrair Airport outside Nagoya, more than 1,000 employees from 787 partners Mitsubishi, Kawasaki and Fuji had an opportunity to see the airplane they help make. **(Insets)** Boeing's service ready operation validation team is pictured in the first and third photos from top left. The wings and other large sections of the 787 are transported from Centrair Airport on the Dreamlifter (in second photo from bottom right, background right) for final assembly in the United States.



Industries, "This was the first time for most of them to see the entire new airplane. It was a very special and encouraging experience."

The general public also got to see the Dreamliner at Centrair Airport. A crowd estimated at about 2,000 turned out to watch it land at 7 a.m. local time on Sunday, July 10.

Boeing and ANA began laying out the SROV plans before completion of the first airplane. Both companies knew that in addition to proving the airplane's capabilities through a robust flight-test program, they had to put the full support system through its paces.

That effort went from plan to reality with the arrival of the 787 at Tokyo's Haneda Airport July 3 after a nonstop flight from Seattle. More than 150 Boeing people were in Tokyo to help run the



tests and demonstrations needed in the following week. About the same number of ANA personnel participated in the effort, which ranged across four cities.

“The 787 has a lot of versatile characteristics,” said Hiroshi Yokomizo, an ANA ground handler. “I would like to master them quickly and be comfortable in doing my job.”

Katsunori Shimazaki, senior manager of Corporate Planning for ANA, said the 787’s visit was a “very valuable experience for ANA, for the ground operation and flight operation.”

And the 787 performed as expected, said Boeing’s Fleming. “We learned a lot,” he said, “and built even stronger relationships across our two organizations.” ■

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PHOTOS: (Above) The 787 lands at Tokyo’s Haneda Airport at the end of a long day. The jetliner returned to Haneda each day after flying service-ready trials at other airports in Japan. **(Insets)** A highlight of the 787’s trip to Japan was a final stop at Centrair Airport, outside Nagoya, where employees of Mitsubishi, Kawasaki and Fuji Heavy Industries and other local suppliers got to tour the Dreamliner cabin, many taking pictures.

Life line

From checking flight helmets to parachutes, the Life Support team helps keep aircrews safe

By Adam Tischler and photos by Rich Rau



PHOTOS: (Above) Van Miller, left, and Tom Metcalf, technicians on the Flight Operations Life Support team with Boeing Test & Evaluation, inspect a parachute. **(Insets, from left)** Ryan Blassie, Aviation Life Support technician, tests a flight helmet and reviews proper fitting of a parachute harness on colleague Nathan Hanson, in flight suit.

Standing in the St. Louis parachute shop, Van Miller makes a quip that reveals a sense of humor built on a singular truth that he and his teammates hold closely—they are the last line of defense for Boeing aircrew.

“We’re always the last one to let you down,” Miller said with a chuckle.

The Flight Operations Life Support team with Boeing Test & Evaluation has its fingerprints, literally, across the organization. If there is a parachute, flight suit or helmet being used by aircrew, Life Support inspects and maintains it. The team teaches training for aircraft rescue and firefighting, and it supports aircrews at air shows and demonstrations around the globe.

“It’s amazing where we go,” Miller said. “That makes the job exciting as well, but it’s a lot of work.”

This team doesn’t mind the hard work, though. As Miller inspects a parachute

alongside Life Support technician Tom Metcalf, their unwavering focus speaks to the intensity of the task. Lives are at stake. Every inch of the parachute is critical.

“With us, we need to make sure it’s done and done right,” Metcalf said. “The professionalism is at an all-time high.”

The scrutiny poured into every piece of equipment, and the standard this team adheres to, comes from the heart, not just best practices and procedures.

“There hasn’t been a day that I haven’t come to work and loved my job,” Miller said. “We know that we’re responsible for them and we’re proud of it.”

They aren’t just keeping equipment safe; they’re keeping their friends and colleagues safe. The aircrews and Life Support teams share a bond that can only come from trust.

“They’re in lock step with us,” said Dave Desmond, chief pilot for Tactical Aircraft. “I can’t speak more highly of any

team that I work with in Flight Operations.”

Metcalf, Miller and other members of the Life Support team also spend a lot of time and effort preparing for air shows. It’s a job that never gets old, Metcalf explained.

“All the effort that you put in preparing to go, the travel you’re doing, the hard work and sweat to get ready, the nervous butterflies you have in your stomach, and no matter how many times you’ve done it before, you can’t wait to see your work,” he said.

Their work sometimes includes outfitting and training customers for demonstration flights.

“When we see that smile on a VIP’s face and the thumbs up,” Metcalf said, “you get satisfaction knowing that you helped make him or her safe and happy.” ■

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out-of-this
WORLD
 research

Boeing helps NASA fast-track research experiments onto the International Space Station

By Ed Memi

On one of its last missions into space, in 2009, *Atlantis* hauled tons of equipment to the International Space Station. The shuttle's cargo also included a colony of tiny worms.

Thousands of them, from a rubbish dump in the United Kingdom city of Bristol.

It was part of a space station experiment to help U.K. researchers better understand what causes the body to lose muscle mass during prolonged periods in a weightless environment. The worms were returned to Earth on the next shuttle mission to the station.

The International Space Station, or ISS, has proved to be a critical, one-of-a-kind platform for microgravity research in biology and biotechnology, Earth and space science, human physiology, physical science, technology development and education. Hundreds of experiments have been placed on board the orbital outpost, with many more planned—although with the shuttle fleet now retired, they will be carried to the station by Russian or other spacecraft.

These experiments have led to advances that will be useful not only in the exploration of space but for helping people on Earth.

- Medical researchers have demonstrated a new method for delivering drugs to cancer cells.
- Studies on the durability of materials in the vacuum of space have already led to changes in materials used in dozens of spacecraft built over the past five years.

- Research on the ability of germs to cause disease could lead to a vaccine for salmonella, a leading cause of food poisoning.

With such promising results, NASA wants to shorten the time it takes to get experiments on the station. And Boeing has done just that.

"Boeing has been instrumental in helping to implement lean payload integration so we can accelerate and accommodate more research on the ISS," said Marybeth Edeen, NASA National Laboratory manager.

The U.S. portion of the station was designated a National Laboratory in 2005, which opened the world's only microgravity laboratory for use by non-NASA researchers. And now that the building phase of the station is complete, astronauts on board have much more time to devote to these experiments.

In February, Boeing and NASA rolled out a variety of technical products that significantly reduce payload integration timelines. Among those products is new testing equipment—which NASA plans to procure—that reduces the amount of time it takes to prepare a payload.

"Ultimately, we want to make the process more user-friendly to scientists, and that will dramatically increase researchers' use of the station while reducing the length of preparation time it takes for launch," said Scott Copeland, Boeing ISS Payloads & Flight Integration director.

Another software tool that Boeing

developed and will license to payload developers lets them operate and interact with their experiments on the station with the very same software they use to conduct their ground experiments.

These, among other improvements, have reduced the time it takes to get research experiments on board the station from what had been 18 to 24 months to only seven to nine months.

It represents a significant step forward in the amount of research that can be done in space—research that began almost 60 years ago when a dog named Laika was launched into orbit in the Russian spacecraft Sputnik 2—an experiment to better understand the effect spaceflight might have on living creatures before humans ventured into the last frontier.

That flight set the stage for scientific research that would prove humans could not only survive in space but go to the moon—and perhaps one day to Mars and back, a journey that could last several years. ■

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PHOTOS: (Below) A view of the International Space Station. **NASA (Insets, from left)** At Marshall Space Flight Center in Huntsville, Ala., Boeing software engineers Tiffany Duncan, left, and Tom Sues review software designed to make it easier to conduct research on board the space station. **MIKE MCCORMICK/BOEING** A materials experiment is mounted on the exterior of the station. **NASA** Astronaut Michael Lopez-Alegria, International Space Station Expedition 14 commander, performs keyboard operations in the station's Destiny laboratory module. **NASA**





PHOTO: Boeing is boosting production of all its jetliners, including the 777 line shown here at the Everett, Wash., factory. Production of the 777 will go from seven airplanes per month to 8.3 in the first quarter of 2013. BOB FERGUSON/BOEING

The big READY

Commercial Airplanes embarks on epic rate increase

By Mike Barber

From a window above the 777 assembly line in Everett, Wash., Brian Baird, director of 777 Business Operations, paused from a complex production discussion to study the hum of activity on the factory floor below.

Boeing employees, like bees buzzing about a hive, skillfully and methodically were building a new 777. Within and outside the airplane, drawing from banks of parts and tools prearranged and neatly aligned, mechanics, engineers and others conducted an artful manufacturing choreography.

"It is almost miraculous the way we put 3 million parts together to fly safely and efficiently as an airplane at

30,000 feet (9 kilometers)," Baird said, admiring the steady work rhythm.

"It is an incredible feat. Boeing is really, really good at integrating all the systems on an airplane and bringing all those parts together, in sequence, on time. It is humbling at times."

What already is a breathtaking process will become more impressive.

From the supply line to the assembly line, Commercial Airplanes employees are carrying out a historic increase in the production rates of all five major airplane programs. Commercial Airplanes will see a 40 percent increase in manufacturing over the next three years.

The decision to increase production

rates stems from customer demand and market insight. Boeing's 2011 Current Market Outlook foresees a need for 33,500 new airplanes valued at \$4 trillion over 20 years. Key drivers include emerging markets and low-cost carriers. Replacement cycles are under way as airlines favor less fuel-thirsty, more environmentally efficient airplanes. Raising rates also helps Commercial Airplanes address a seven-year backlog and get airplanes to customers sooner.

Commercial jetliners are probably the most complicated mass-produced products in the world. One Next-Generation 737 is composed of more than 300,000 parts, while the 767 and 777 require



PHOTOS: (Above) A 747-8 Intercontinental in final assembly at the Everett, Wash., plant. **BOB FERGUSON/BOEING** **(Far right)** Next-Generation 737 fuselage assemblies arrive by train at the Renton, Wash., plant from Wichita, Kan., for final assembly. Production of the 737 will hit 42 airplanes a month in 2014. **JIM ANDERSON/BOEING**

To respond to the production rate increase and meet emerging needs, Commercial Airplanes since January 2011 has hired more than 5,000 employees and conducted 26 interview and hiring events.

3 million parts. The mighty 747 requires 6 million parts.

Boeing's supply chain handles more than a half-billion parts a year. Across 30 nations, Commercial Airplanes has nearly 1,400 production suppliers, at least half of them small businesses, said Jon Geiger, director of Business Operations for Commercial Airplanes Supply Chain Management & Operations. Supplier Management has nearly 2,600 employees who manage a shifting number of 2,500 to 4,000 suppliers providing parts from around the world.

Ramping up production capacity and capability in a system of that magnitude requires confidence in the production and supply systems.

Boeing's confidence, ironically, stems in part from lessons learned in 1998, when comprehensive rate readiness was attempted unsuccessfully. After a dip in production due to a recession, and supplier consolidations and layoffs, Boeing and its suppliers increased rates up a very steep curve. The strain on the supply chain ultimately shut down assembly lines.

"We got in trouble when we went up

in rate in 1998. Fortunately there is a lot of scar tissue on the organization because of that," Jim Albaugh, president and CEO of Commercial Airplanes, told Boeing investors at a conference in Seattle in May. "We'll learn from those mistakes and get it right this time."

Today, Boeing is in a much different situation, with a healthier supply base and suppliers already in a rate-up situation. The lessons learned from 1998 have evolved into a disciplined system of checks and balances, with production rate decisions integrated across all airplane programs and

the supply chain. Resources are focused on retaining smooth production capacity and capability while avoiding disruptions surrounding rate breaks. Rigorous attention to risk mitigation ensures the right tools, equipment and people are in place to sustain a healthy production system and supply base.

"It is a very dynamic process," said Jenette Ramos, vice president of Operations Supply Chain Rate Capability, Commercial Airplanes Supplier Management. "We are shifting the culture from being reactive to proactive—to one where we seek risks so we can manage them."

Already, airplanes are being built at unprecedented rates for Boeing.

Lean+ practices implemented since 1998, for example, provide the capacity to make rate while enhancing quality and cost efficiency and mitigating waste. A mature Lean+ line is a key reason the Next-Generation 737 program, for example, halved the build time for one airplane from 22 days to 11 days, and why the program recently announced it will increase rate to 42 airplanes a month in 2014.

In addition to Lean+, other significant changes since 1998 that specifically address smooth operations include production rate assessments (PRAs) and strict rate-break rules.

"PRAs were the first steps in lessons learned" after 1998, said Geiger. Teams of specialists evaluate suppliers at all levels, identify gaps and ensure they are filled.

Ramos, who heads an effort to ensure teams are equipped with operational expertise, compares them to referees unafraid to call a penalty.

"It's sort of like playing a game on the field and you have to throw the yellow flag—and you have to be okay with throwing the yellow flag," Ramos said.

Baird, meanwhile, said strict rate-break rules "are heavily integrated across all programs; we didn't use to have that."

The rules prevent more than one program from increasing rate at any given time. For a program to go up in rate, it must select an open window where no other program is breaking rate. A disciplined rate must be maintained for six months before it can be stepped up, with two months' separation from any other program.

To respond to the production rate increase and meet emerging needs, Commercial Airplanes since January 2011



By the numbers

Boeing is boosting production rates for all its commercial jets

- **Next-Generation 737:** From 31.5 airplanes per month to 35 per month in early 2012 to 38 per month in second quarter of 2013 to 42 in 2014
- **747:** 1.5 per month to 2 per month in mid-2012
- **767:** 1.5 per month to 2 per month in mid-2011
- **777:** 7 per month to 8.3 in first quarter of 2013
- **787:** 2 per month to 10 per month by late 2013

has hired more than 5,000 employees and conducted 26 interview and hiring events, according to Boeing Global Staffing, Shared Services Group.

Boeing Fabrication, meanwhile, with 11 sites in Australia, Canada and the U.S., has the strategic capacity for emergent work—making sure parts are available to avoid production delays. The division performs quick turnarounds needed because of redesign, damaged parts or a parts shortage until a supply base stabilizes.

"You really have to be intentional about making these decisions," said Jim Ockerman, director of Business Operations, Boeing Fabrication. "There's a lot of analysis about capability, capacity and tooling to support that rate before

you even start thinking about the people you need in that system."

Like Baird, Ockerman paused to reflect on how meeting the challenge of rate readiness begins and ends with customers.

"If you can visualize millions of pieces coming together through multiple hands all the way until you are sitting on an airplane," he said, "it is an amazing value stream." ■

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Boeing's universal translator makes sense of computerspeak

By Peggy Mason

You hear it a lot in reference to laptops, tablets, smartphones and other computing devices.

"There's an app for that!"

An app is software that works seamlessly on a computing device, enabling the user to easily perform singular or multiple related tasks. Apps work because something that resembles a universal translator, or middleware, allows the app to talk to the operating system of the computing device.

Boeing's customers—both military and civilian—are looking for universal

translators that can connect all of the various software programs that make up each computer's program package while offering a high level of security to protect both users and information on the network.

That's where employees such as Network and Tactical Systems software engineers Mark Boyd and Jennifer Woodward apply their expertise and creativity.

"It's not enough to meet requirements—we have to develop something that will perform to make the warfighter's life safer, easier," said Boyd. He's chief engineer for the program that goes by the unwieldy name of SOSCOE, or System of Systems Common Operating Environment.

SOSCOE is Boeing's universal translator, ensuring that older and newer apps on computer systems talk with one another in a secure environment.

It started out as part of the Boeing program known as Future Combat Systems.

In 2003, when Future Combat Systems was more idea than reality, the concept was a secure, underlying middleware to allow the U.S. Army's existing systems to work seamlessly with the new tools and equipment that were part of Future Combat Systems.

That was a "monstrous task," said Paul Schoen, director of infrastructure software development for SOSCOE.

Future Combat Systems has since evolved into the Brigade Combat Team Modernization program, which will provide new capabilities to all of the Army's brigade combat teams.

Meanwhile, SOSCOE has moved beyond just the Army into other areas. The U.S. Department for Homeland Security currently uses SOSCOE for border security.

Schoen fully expects elements of the software to be useful for international customers such as Australia, Canada, the United Kingdom and several European countries. Additionally, he hopes to move into commercial markets as a service provider, similar to software companies, and offer a tool kit based on Boeing's secure software that is used to create applications.

Boyd, Woodward and about 70 of their teammates with Network and Tactical Systems are helping refine SOSCOE, mostly in Southern California at the Huntington Beach site.

Woodward, a former intern, was hired by Boeing upon graduation from California State University at Long Beach. She started integrating Lean+ on the C-17 program, and when her manager recommended her as a good candidate for

middleware creation, she jumped at the chance to be on the leading edge of some of the world's most advanced software technology.

"I'm not one for complacency," said Woodward, execution lead for SOSCOE. "I get bored if I don't have something to reach for."

Fortunately for Woodward and her teammates, working on this middleware offers such a broad range of challenges that boredom is never an issue.

Woodward urges current interns and new hires to consider joining the team. "We still have challenges that would intrigue new interns," she said, but warns that "it's tough because of the fast pace."

Boyd is a Boeing Technical Fellow specializing in graphical user interfaces.

He echoed Woodward's sentiments about the pace. "This is a quick-moving environment."

"If you come into work every day and ask, 'What's possible?' that's the right thing," Boyd added. "If you don't show progress, you lose your customer. The rate at which technology is moving forward is accelerating, as are the changing needs of our customers. Teams must show that they are keeping up, and producing products that meet the customers' needs to remain relevant." ■

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Kick-apps



PHOTOS: Boeing's universal translator, known as SOSCOE, was developed for its U.S. Army customer to enable software programs and sensors to work together seamlessly to produce improved network performance. But it is now being used beyond the military. **RICH RAU/BOEING** (Employee insets, from left) Paul Schoen, Jennifer Woodward and Mark Boyd of Boeing Network and Tactical Systems. **PAUL PINNER/BOEING**

Task masters

Boeing teams develop new method to optimize jetliner maintenance intervals—saving airlines money

By Jeff Wood



A modern jetliner is an assembly of tens of thousands of hardware and software parts, all of which must be checked at appropriate intervals to ensure they are functional and properly maintained.

Now, a new statistical analysis technique is helping Boeing maintenance engineers home in on the most effective maintenance intervals—earlier in the service life of an airplane model.

It pinpoints the optimum inspection interval for various maintenance tasks based on statistical analysis of worldwide operator experience with the airplane. This can minimize maintenance costs and increase the time an airplane is

available for revenue-earning flight.

Indeed, after using the analysis to review 777 maintenance schedules, intervals for 68 percent of the jetliner's 7,500-flight-hour checks were increased, 26 percent of task intervals remained the same, 6 percent were shortened, and one task was deemed unnecessary and deleted.

And there is potential application beyond jetliners and Commercial Airplanes.

"A maintenance program is not static," said Brian McLoughlin, a senior manager in Boeing Commercial Aviation Services' Maintenance Engineering organization. "It's designed to incorporate knowledge gained through the entire service life of an airplane model."

Maintenance requirements for new airplanes and systems are based on testing under laboratory conditions and on historical and predictive data. But over time, in-service experience can tell a clearer story.

Boeing works continuously with systems manufacturers, airlines and regulatory agencies to optimize maintenance intervals based on in-service performance experienced by its airplanes around the world.

The new, advanced statistical method, approved by the U.S. Federal Aviation Administration, European Aviation Safety Agency and Transport Canada, was developed by a team of technical

experts from Boeing Commercial Airplanes, Commercial Aviation Services, Boeing Research & Technology, and Information Technology.

"Statistical analysis helps engineers identify historical and emerging performance trends in the fleet," McLoughlin said. "Engineers now can define the point where it costs airlines less to proactively schedule maintenance than to risk encountering an unscheduled maintenance event."

The team is further developing the tool to forecast parts and material needs for scheduled aircraft maintenance visits, commonly known as A, B, C and D checks.

The method could be equally valuable for other aerospace products across the Boeing enterprise, said Geoff Evans, director of Advanced Services for Boeing Commercial Aviation Services and Global Services & Support. Evans' group looks for synergies in product offerings across the company.

"Accurate determination of component service life," Evans noted, "could allow much more effective mission planning for satellites and other autonomous systems." ■

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PHOTO: Boeing has developed a new statistical analysis technique that helps airlines minimize maintenance costs and maximize airplane availability. GREG THON/BOEING

Screen test



Measuring the good and bad

On-site health screenings can point the way to improved well-being

By Susan Birkholtz

It was the kick-start that Michael Schlager needed to do something about his health.

Four years ago, the 34-year-old Jeppesen aviation meteorologist in San Jose, Calif., participated in Boeing's on-site health screening program. The results were not that good.

His screening showed elevated cholesterol, triglycerides, blood sugar and blood pressure levels, and his body mass index was too high.

"If it hadn't been for the convenience of being able to get screened on-site, I'm not sure I would have found out about my situation until much later," said Schlager, who doesn't recall ever having his numbers checked previously.

On-site health screenings such as the one Schlager took part in are being offered at most U.S. work sites through Sept. 30. They are available to U.S. Boeing employees and U.S. subsidiary employees, except in some circumstances where a subsidiary maintains its own health plans.

A nurse discussed the results with Schlager after the screening and advised him to follow up with his personal physician. Bottom line: Schlager needed to lose weight. Motivated to get healthy and not fall victim to a family history of diabetes, Schlager next completed the online Health Assessment and started working with a Boeing-sponsored

personal health coach to set goals and stay motivated.

With guidance from his coach, Schlager began to reduce portion sizes and to eat more fruits, vegetables and whole grains. His coach also helped him initiate an exercise program—getting him back on his bike, which had been gathering dust, and into a neighborhood gym.

"It was a definite motivator working with the health coach and having someone to keep me accountable," said Schlager, who now weighs 50 pounds (23 kilograms) less than he did four years ago. And, due in large part to the weight loss, his health numbers are now within normal limits.

Today, exercise and eating right have become a way of life for Schlager, even though his work schedule changes constantly and makes it challenging to establish a set workout routine. He makes a conscious effort to keep himself on track.

"I don't want to lose what I've gained, and I know it gets harder to keep the weight off as you get older," said Schlager, who now makes it a point to get screened on-site yearly. "Having screenings available on-site every year lets me check in to see how I'm doing. And they've helped me improve my dialogue with my doctor."

Schlager credits his healthier lifestyle habits with a happier and more social life, improved self-confidence, and increased productivity on and off the job.

What's on the horizon? Schlager wants to maintain his weight loss and take his workout routine to the next level by incorporating more weight training and running a race for the first time.

In fact, he's thinking it's time to call a health coach again to make these goals a reality. ■

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PHOTO: An on-site health screening convinced Michael Schlager to focus more on his health. Today, exercise and eating right have become a way of life for him. He plans to continue the annual on-site screenings. PAUL PINNER/BOEING

Confidential screenings are offered at no cost to employees and measure:

- Total cholesterol
- LDL ("bad") cholesterol
- HDL ("good") cholesterol
- Triglycerides
- Glucose (blood sugar)
- Blood pressure
- Body mass index (BMI)
- Waist circumference

For schedule information or to make an appointment, visit www.boeing.com/screenings. Walk-ins will be accommodated as space permits.

Win a \$100 movie gift card

Every employee who gets screened on-site will be entered into a drawing to receive a \$100 movie gift card.* Each week through Sept. 30, the names of 100 employees who were screened on-site that week will be randomly drawn to receive a gift card. Winners will be notified by email approximately three to four weeks after getting screened.

* If your work site has fewer than 50 employees and does not offer on-site screenings, you will receive an email explaining how you can qualify to be entered into the drawing for the \$100 movie gift card.

TWILIGHT OF THE SHUTTLE

With vapor trails swirling behind it in the predawn darkness, Space Shuttle *Atlantis* lands at the Kennedy Space Center at Cape Canaveral, Fla., July 21, marking the end of NASA's 30-year shuttle program. Thousands gathered near the landing strip to witness the historic event, while millions more watched on TV. *Atlantis* landed at 5:57 a.m. "I saw grown men and grown women crying today—tears of joy to be sure," Mike Leinbach, shuttle flight director, told reporters. It was the 135th mission for the space shuttle fleet, which flew 542 million miles (870 million kilometers) and circled Earth 21,152 times since the first flight of *Columbia* in 1981. The five shuttles carried 355 people from 16 countries and, altogether, spent nearly four years in space. Boeing and its heritage companies built the space shuttle orbiters and supported operations. The shuttles now are heading to museums, with *Atlantis* to be placed on public display at the Kennedy Space Center Visitor Complex.

PHOTO: ASSOCIATED PRESS





MADE WITH JAPAN

人に優しいこと、環境に優しいことが、
今ほど未来のために必要とされる時代はありません。
ボーイングは、日本の航空宇宙産業を担うパートナー企業と共に、
半世紀以上にわたって地球環境により優しい性能を追い求めています。
そのひとつの理想形が、次世代中型旅客機787ドリームライナー。
同クラスの航空機よりも大幅に改善された燃料効率と
二酸化炭素排出量は、世界に衝撃と希望をもたらしたといえるでしょう。
この最先端の機体の35%は日本で製造されており、
三菱重工、川崎重工、富士重工を始めとするパートナー企業が
同じ思いで開発を支えています。
東レと共同開発した強くて軽い炭素繊維複合材料による機体は、
従来は不可能であった快適な温度コントロールをも実現しました。
また、ボーイングは、環境負荷の少ないバイオ燃料の開発テストを
JALやANAなどと世界に先駆けてスタート。
地球の未来のために、さあ、一緒にすごいこと。

 **BOEING**