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HIGH ASPIRATIONS

Phantom Eye soars after quick work by 'One Boeing' team



“We’re able to do more and more phenomenal things with this platform — soldiers on the ground know everything’s going to be okay because the Apache is there.”

John Schibler
Boeing Chief Engineer
Attack Helicopter Programs

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at Boeing



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16

EYE FOR SUCCESS

When Boeing's unmanned, liquid hydrogen-powered Phantom Eye completed a successful second test flight in late February over Edwards Air Force Base, Calif., it was testament to the work of a "One Boeing" team—including experts from the company's F/A-18 Super Hornet program—that redesigned the aircraft's landing gear system. This *Frontiers* photo essay captures the exacting preparation and teamwork that made the second flight of Phantom Eye successful, with the unmanned craft reaching an altitude of more than 8,000 feet (2,400 meters).

COVER: PHANTOM EYE IS SHOWN ON THE DRY LAKEBED AT NASA'S DRYDEN FLIGHT RESEARCH CENTER IN CALIFORNIA AFTER ITS SECOND TEST FLIGHT IN LATE FEBRUARY. IT IS DESIGNED TO TILT AND REST ON ITS WINGTIP AFTER COMING TO A STOP. BOB FERGUSON/BOEING

PHOTO: SHOWN IN THE EARLY MORNING DESERT LIGHT BEFORE ITS SECOND TEST FLIGHT, PHANTOM EYE WAS DEVELOPED TO CRUISE AT ALTITUDES AS HIGH AS 65,000 FEET (19,800 METERS) FOR FOUR CONSECUTIVE DAYS, PERFORMING MILITARY OR CIVILIAN MISSIONS INCLUDING BATTLEFIELD AND BORDER OBSERVATION. BOB FERGUSON/BOEING

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12

FLIGHT OF PASSAGE

After 178 flights and more than 480 flight-hours, the P-8I has completed a successful flight-test program that included dropping inert weapons. Boeing is under contract to build eight of the P-8I, a maritime reconnaissance and anti-submarine warfare aircraft based on the 737 jetliner, for the Indian Navy. The first three are scheduled for delivery this year.

PHOTO: LEO DEJILLAS/BOEING



AD WATCH

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

Inside cover:



"The New Apache: A Soldier's Guardian" is one in a series of innovation stories told by Boeing employees such as John Schibler. Learn more at www.boeing.com/stories.

Page 6:



Boeing sponsored the Electrical and Computer Engineering Department Head Association Expo last month. This sponsorship represents one way that Boeing strengthens relationships with educators in strategic skills areas.

24

TALENT FOR GROWTH

Boeing's fast-growing site, Oklahoma City, has assembled strong and diverse talent that supports a number of engineering and aircraft programs. Whether helping upgrade planes such as the B-1 bomber at nearby Tinker Air Force Base or equipping military aircraft with secure communications, site employees say they are excited by the rapid growth and welcome the additional people and resources. PHOTO: BOB FERGUSON/BOEING



Inside

07

LEADERSHIP MESSAGE

Boeing has a rich heritage of helping and strengthening communities, and opportunities are greater than ever for employees to carry on that tradition by volunteering their time, unique skills and abilities, says Lianne Stein, vice president, Global Corporate Citizenship. Through volunteering, Boeing employees can make a positive difference in the lives of people around the globe, she writes.

08

SNAPSHOT/
QUOTABLES

33

WHY WE'RE HERE

34

MILESTONES

38

IN FOCUS

Pages 10–11:



"Enduring Awareness," featuring ScanEagle, is one of several ads in a Boeing Defense, Space & Security advertising campaign highlighting the capabilities

Boeing brings to its customers. The ads are running in print and online business, political and trade publications.

Back cover:



Boeing holds itself to the highest ethical standards by following a set of core values. One of those, people working together, is highlighted in this print ad. It speaks to how innovation comes from great ideas—which come from an open work culture. This ad is scheduled to run in the first-quarter issue of *Ethisphere*.



LIFE IS AMAZING IF YOU ALWAYS LOOK UP.

Who knows where
future leaders might find
their next inspiration or how
the next great dream will begin?
Boeing is proud to support the
young minds of today so that they can
become the visionaries of tomorrow.



Making a difference

The opportunity to positively impact communities is greater than ever



Lianne Stein

Vice president, Global Corporate Citizenship

Since Boeing's first charitable donation in 1917 to the University of Washington, we've had the vision to understand then—as we do now—that the enduring strength of our business depends on healthy, vibrant and educated communities.

We continue to build on our company's legacy of strengthening communities. From creating products and services that are cleaner and more efficient to conducting business responsibly and investing in our communities, we live up to our proud heritage in the things we do to make a positive difference in people's lives today and for generations to come.

Game-changing innovation and transcending boundaries will always be the heart of Boeing. And just as our business has evolved to meet the challenges of a global marketplace, so has our approach to community engagement. Today, our customers and stakeholders expect us to be active participants and contributors in their communities, and in this era of unprecedented economic and geopolitical turmoil, there is certainly no shortage of need.

As Global Corporate Citizenship looks to further align, integrate and sharpen the focus of community engagement efforts with Boeing's businesses, we help create mutual benefit and build better communities worldwide.

Our investments focus on enhancing lifelong learning and achieving positive outcomes in the areas of education, environment, health and human services, as well as arts and civic engagement—all of which benefits the long-term success of our company and communities.

But beyond vital financial support, many of our lasting contributions occur every day as Boeing people share their time and skills with their neighbors.

From mentoring military personnel transitioning into the private sector to preparing students for high-tech careers to helping nonprofits increase their efficiency and reach, Boeing employees make a positive difference in the lives of people around the globe. Volunteering in the community also develops leadership skills, enhances teamwork and attracts talented people to work at Boeing who share our values.

As we celebrate Earth Day this month and other observances throughout the year, our individual and collective actions send a powerful message about Boeing's commitment to bring value to the diverse communities we serve. And new this year, in response to employee feedback, Boeing's annual Global Day of Service, which traditionally took place on a single Saturday in July, will be extended to cover the entire month. Of course, Boeing employees will continue to contribute to the vitality of our communities year-round by volunteering as part of company efforts and in their personal lives.

Helping communities is a shared endeavor. Our heritage of strengthening communities through our unique skills and abilities reinforces the values established by Bill Boeing nearly 100 years ago. ■

To learn more about how Boeing and its employees are building better communities worldwide, see the 2012 Corporate Citizenship Report at www.boeing.com/community.

PHOTO: BOB FERGUSON/BOEING

Freight expectations

The first 747-8 Freighter Boeing built takes off from Paine Field in Everett, Wash., last month following formal delivery to launch-customer Cargolux. The airplane was the cornerstone of Boeing's 747-8 Freighter flight-test program—then refurbished for service with Cargolux. Founded in 1970, Cargolux ordered its first Boeing airplane, a 747-200 Freighter, in 1977. It has ordered 13 of the 747-8 Freighters; seven have been delivered including this one. Overall, this was the 25th 747 delivery to Cargolux. PHOTO: MATTHEW THOMPSON/BOEING





“That’s the most important aircraft in the U.S. Air Force in more than two decades.”

– Maj. Gen. John Thompson, Air Force program executive officer for tankers, speaking to Boeing 767 employees in Everett, Wash. The 767 program is scheduled to begin production of the first Air Force tanker this year. *Boeing News Now*, March 11.

“I plan to fly on the very first flight.”

– Ray Conner, president and chief executive, Boeing Commercial Airplanes, expressing confidence at a press conference in Japan that the 787 will soon return to commercial service as a result of additional safety measures Boeing is adding to lithium-ion batteries on the airplane. *Seattle Times*, March 15.

“I’m seeing the future of Australian manufacturing.”

– Australian Prime Minister Julia Gillard during a visit to Boeing Aerostructures Australia in Melbourne, Australia. Boeing Australia is the company’s largest operational footprint outside the United States, with more than 3,000 employees focused on defense products and services, high-technology manufacturing, research and development, support, training, air traffic management, and logistics.



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RANGE OF SUCCESS

Teamwork key to successful P-8I flight-test program

By Chick Ramey

Whether performing test flights over a U.S. Navy range west of Neah Bay in Washington state or dropping inert weapons at a range near Yuma, Ariz., the P-8I maritime reconnaissance and anti-submarine aircraft has proved ready to tackle its next mission—with the Indian Navy.

Boeing is working hard to ensure the P-8I meets the Indian customer's requirements and recently completed its P-8I flight-test program.

"The Indian Navy can't wait to receive its first three aircraft this year," said P-8I Program Manager Leland Wight. The success of the flight-test program, which was completed in February, was a total team effort, he added.

"The 'One Boeing' team is really at the top of its game on this program," Wight said. "Our Military Aircraft and Commercial Airplanes people have come together to design and build a fabulous plane for both the U.S. and Indian navies."

Wight also lauded the job done by the Boeing Test & Evaluation team when the P-8I flight-test program got under way in July 2012.

Boeing developed the P-8A Poseidon, a military derivative of the Next-Generation 737-800 commercial jetliner, for the U.S. Navy as a replace-

PHOTO: A P-8I carries wing-mounted inert Harpoon missiles over the Pacific Northwest Cascades during flight test.

JOHN PARKER/BOEING





**“THE ‘ONE BOEING’
TEAM IS REALLY
AT THE TOP OF
ITS GAME ON THIS
PROGRAM.”**

– Leland Wight, P-8I program manager



**IN FIVE TEST DAYS,
“WE DID 27 DROPS,
WHICH IS UNHEARD
OF AND A TESTAMENT
TO THE ENTIRE TEAM.”**

– Jeanette Croppi, test program manager with
Boeing Test & Evaluation



ment for the service's aging P-3 Orion submarine hunters. International customers are also interested. The Indian Navy has ordered eight, with the last to be delivered by the end of 2015.

Keith Smith, P-8I chief engineer and director of integration, said the P-8I team with Defense, Space & Security was tightly integrated with the Boeing Test & Evaluation team to plan and execute the flight-test program.

"The collaborative approach, including colocating our teams, was instrumental in efficiently executing the test program," Smith said.

The teams started out flight-testing the P-8I's mission system, which includes its sensors and communication systems. They then quickly transitioned to "stores" tests, during which the P-8I carried inert weapon shapes under its wings to demonstrate the aircraft was capable of carrying all the weapons the Indian Navy will use during missions. These included the Harpoon anti-ship missile and depth bombs that can be dropped on enemy submarines.

When the flight testing moved to Arizona in January, the weapons separation drops were completed in only five test days, said Jeanette Croppi, test program manager with Boeing Test & Evaluation.

"We did 27 drops, which is unheard of and a testament to the entire team," she said.

In all, the P-8I made 178 test flights, which amounted to more than 480 flight-hours.

"I've been part of other successful Boeing flight-test programs," Smith said, "but have never seen one run so effectively." ■

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To see a related video, visit www.boeing.com/frontiers/videos/april

PHOTO: A P-8I performs weapons drops using inert Mk-82 depth bombs at a test range near Yuma, Ariz. A Boeing Test & Evaluation T-38 chase airplane follows.

LEO DEJILLAS/BOEING

Cleared for landing



'One Boeing' teamwork paved the way for Phantom Eye to resume test flights

By Eric Carlson and photos by Bob Ferguson

When structural analysis engineer Ed Nowakowski and design engineer Mike Knoble, both on the F/A-18 landing gear team, heard about a landing gear issue on what had otherwise been a successful first flight of Boeing's unmanned, liquid hydrogen-powered Phantom Eye, they immediately wondered how they might be of help.

It didn't take long for the "One Boeing" call for assistance to go out.

"The day we found out they wanted us to help, our team was in the lab that afternoon looking at parts and starting the investigation to determine what really happened," Nowakowski said.

Some nine months later, in late February, Phantom Eye flew again—and this time made a picture-perfect landing on the high desert of Edwards Air Force Base in California. The flight was a



tribute to teamwork across Boeing.

The landing was “spectacularly benign,” said Boeing Technical Fellow Eric Reichenbach, a member of the Phantom Eye team.

Benign, but highly successful.

“With this flight, we further validated Phantom Eye’s ability to provide a persistent eye in the sky,” said Drew Mallow, Phantom Eye program manager. “It took a dedicated team to reach this milestone. Colleagues from across the company shared their time and knowledge to make this test a success.”

Although they were not part of Phantom Eye’s original landing gear team, Knoble and Nowakowski have been working on landing gear for a number of aircraft, including the F/A-18 Hornet, F-15 Eagle, AV-8B Harrier II and T-45 Goshawk for some 40 years combined. Their experience, together with the expertise of additional F/A-18 landing gear teammates as well as Boeing Research & Technology and Phantom Works colleagues, proved invaluable. The team completed in a few short months a landing gear redesign that otherwise could have taken more than a year, according to Phantom Eye airframe team leader Terry Richardson.

Phantom Eye has a unique way of taking off and landing. To reduce weight and increase how long it can remain aloft, Phantom Eye lifts off from a moving launch cart that rolls to a stop after the large unmanned aerial vehicle (UAV) is airborne. Phantom Eye lands like a glider on a main landing gear skid and a conventional nose landing gear wheel and tire assembly.

After Phantom Eye’s first flight in June of last year, Boeing teams quickly went to work to figure out why the nose landing gear broke when it touched down on the desert lakebed.

Understanding the urgency to return Phantom Eye to flight testing, the team completed what’s known as the Root Cause Corrective Action process, a Lean+ Element that begins with clearly defining the problem and analyzing and understanding

PHOTOS: (Above) After a second successful flight, Phantom Eye touches down on its newly redesigned landing gear system on the lakebed of NASA’s Dryden Flight Research Center in California. (Inset) Ed Nowakowski, left, and Mike Knoble, both on the F/A-18 landing gear team, with the landing gear of a Super Hornet.

“The team essentially redesigned, tested and had the landing gear manufactured in the amount of time it normally takes to do one of those phases.”

— Ed Nowakowski, structural analysis engineer on the F/A-18 landing gear team in St. Louis





the causes before making any changes.

"Our first few weeks were spent collecting information about the airframe and the landing gear. We collected all the necessary data to begin the redesign effort," Knoble explained.

The results of the analysis led to the design and installation of a stronger landing gear.

"The team essentially redesigned, tested and had the landing gear manufactured in the amount of time it normally takes to do one of those phases," Nowakowski said.

Their work paid off, as Phantom Eye returned to flight Feb. 25. During the flight, at NASA's Dryden Flight Research Center at Edwards Air Force Base, the aircraft climbed above an altitude of 8,000 feet (2,400 meters) and remained aloft for 66 minutes at a cruising speed of 62 knots (71 mph, or 115 kilometers per hour) before landing.

"There are many unknowns in a fast-moving program like Phantom Eye," Nowakowski said. "As engineers, we know there's always something that could be out there that we've missed. Once we knew the landing gear successfully deployed, that was a big relief, and we were even more relieved when we heard the aircraft landed without issue."

Added Knoble: "There's a real feeling of satisfaction knowing you've done things right."

Richardson of Boeing Research & Technology stressed how harnessing the talents of the One Boeing workforce was integral to the successful return to flight.

"The biggest thing is never be afraid to ask questions outside your immediate circle," Richardson said.

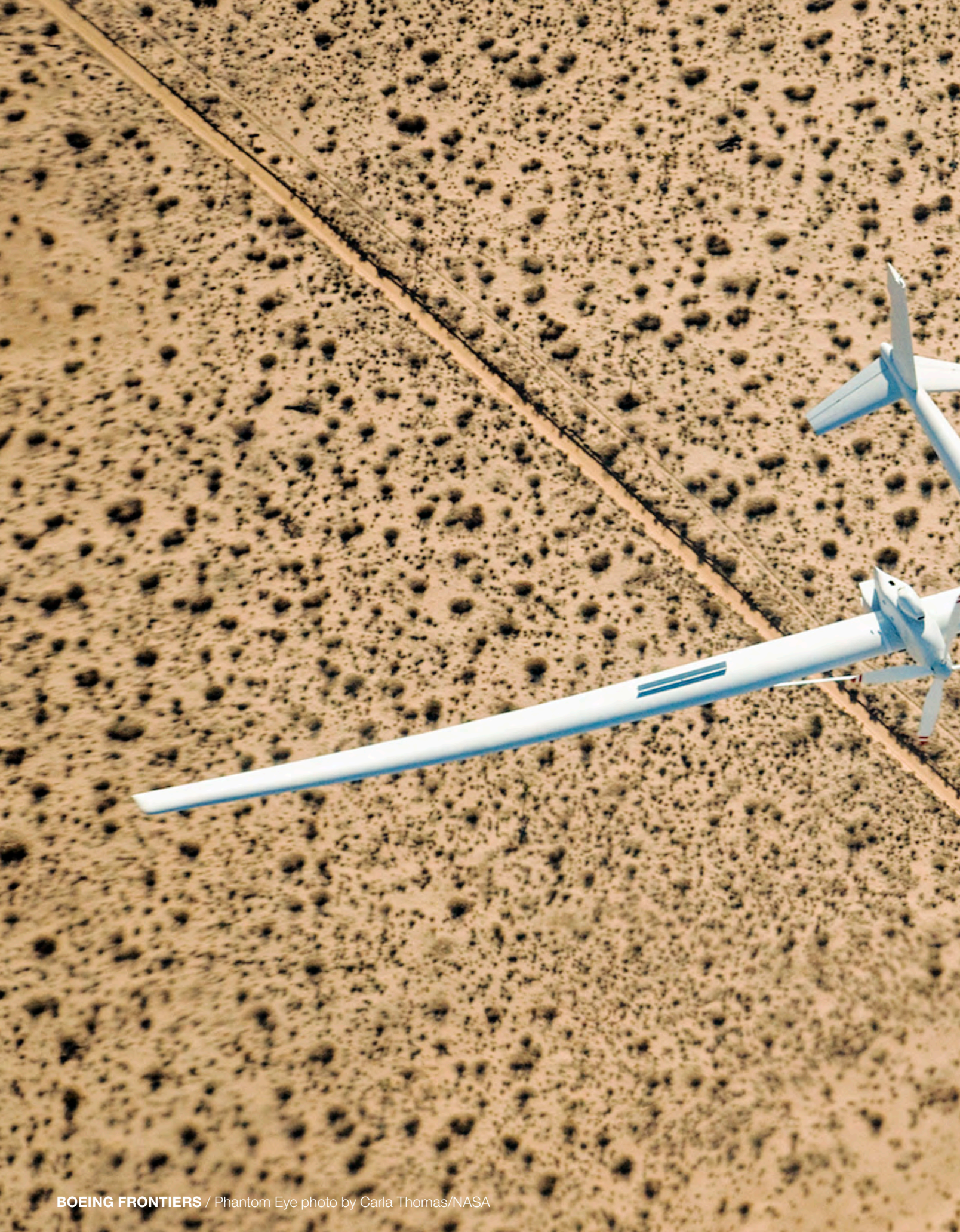
"If you don't know something, in just a matter of seconds you can find the right person to go to. There are abundant resources for problem-solving across the company."

Phantom Eye represents a major push for the company in the long-endurance UAV market. The aircraft is designed to perform battlefield and border observation, port security and telecommunications at high altitudes for up to four days.

Besides military applications, Phantom Eye could be used to meet a variety of commercial and civil requirements, according to program officials. It could help scientists track weather patterns and predict where hurricanes or tornadoes might hit. It could also be used to monitor disaster areas and relay critical data to ground crews who can then prioritize and dispatch resources quickly and efficiently.

With a 150-foot (46-meter) wingspan, Phantom Eye is designed to eventually cruise at altitudes up to 65,000 feet (19,800 meters). Its hydrogen-powered propulsion system is what sets Phantom Eye apart. It consists of nothing more than two Ford Ranger truck engines converted to burn liquid hydrogen, which has more energy content than aviation fuel and burns more cleanly. The result is an aircraft that produces only water as a byproduct, leading to

PHOTOS: (Clockwise from bottom left) Phantom Eye takes off from its launch cart, which has been redesigned to reduce drag and increase speed; soaring at an altitude of 8,000 feet (2,400 meters); the unmanned aerial vehicle glides in for a smooth landing on the California lakebed; after landing and coming to a stop on the runway, Phantom Eye leans on its wing for balance; Phantom Eye's landing skid provides support.





“With this flight, we further validated Phantom Eye’s ability to provide a persistent eye in the sky. ... Colleagues from across the company shared their time and knowledge to make this test a success.”

– Drew Mallow, Phantom Eye program manager





a significantly reduced carbon footprint.

Future Phantom Eye flight tests will continue expanding the aircraft's flight altitude and endurance until it achieves its goal of staying aloft for four consecutive days at very high altitudes.

The chance to work on Phantom Eye, Knoble said, has been one of the most rewarding challenges in his 32-year engineering career.

"It's so motivating and exciting to be part of a program that moves at such a fast pace to accomplish a goal," he said. "It's what makes people dedicate their time and energy—all because you have that goal in sight." ■

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PHOTOS: (Pages 20–21) With its 150-foot (46-meter) wingspan, the unmanned Phantom Eye soars over the lakebed of Edwards Air Force Base, Calif., during its Feb. 25 second flight. **NASA** (Clockwise from top) The team endures frigid early morning temperatures to prepare the unmanned aircraft for its second test flight; Phantom Eye is inspected before takeoff; the aircraft's liquid hydrogen tanks are monitored leading up to the flight—Phantom Eye's two modified Ford truck engines produce only water as a byproduct from the clean-burning hydrogen fuel.

Boeing's 'best-kept secret'

Fast-growing Oklahoma City site has engineering expertise at its core

By Eric Fetters-Walp and photos by Bob Ferguson





“We bring the strength of being the original manufacturer of these aircraft and our expertise in keeping them modernized, reliable and safe.”

– Steve Goo, senior site executive for Boeing Oklahoma City

Most Oklahoma City residents may not have known Boeing had a workforce there a few years ago. One of the company's working spaces was behind a former grocery store. Another office was located above a Chinese restaurant.

Then, in 2008, Boeing Defense, Space & Security opened a four-story office building across the street from Tinker Air Force Base.

“When we built that, Boeing put down a real footprint here,” said Robert Haley, a Facilities project administrator at the site.

If that's the case, Boeing now has planted two feet firmly on the ground in Oklahoma City with last year's opening of a six-story office building next door to its first one.

“It's huge for us,” said Karen Jones, Human Resources generalist at the site. “We used to be spread out, and people didn't realize Boeing was here. These buildings have made us much more visible. Everybody here's really excited and welcoming of the new people moving in.”

Engineers and support employees in finance, logistics and other specialties are moving to the site from both California

PHOTO: (Left) Larry Dongilli, a Boeing Test & Evaluation Lab technician, in the C-130 Avionics Modernization Program software development node at the Oklahoma City site.

and Wichita, Kan., pushing the site's head count above 1,400. By the end of this year, that number could top 1,800.

There's no coincidence in the site's location near Tinker Air Force Base, the nation's second-largest military air depot. It is the site's largest customer, and a couple hundred Boeing employees work inside Tinker's gates upgrading flight software and providing on-site support to the U.S. Air Force mechanics and others who maintain and overhaul B-1 and B-52 bombers, the KC-135 tanker, and other cargo and surveillance aircraft. Additionally, Boeing is upgrading the flight decks of the Lockheed C-130 fleet operated by the U.S. Air Force. This includes a new digital glass cockpit.

"We took all of the programs we have at Global Support & Services that have Tinker as the primary customer and moved them here," said Steve Goo, vice president of Aircraft Modernization and Sustainment and senior site executive for Boeing Oklahoma City. "We bring the strength of being the original manufacturer of these aircraft and our expertise in keeping them modernized, reliable and safe."

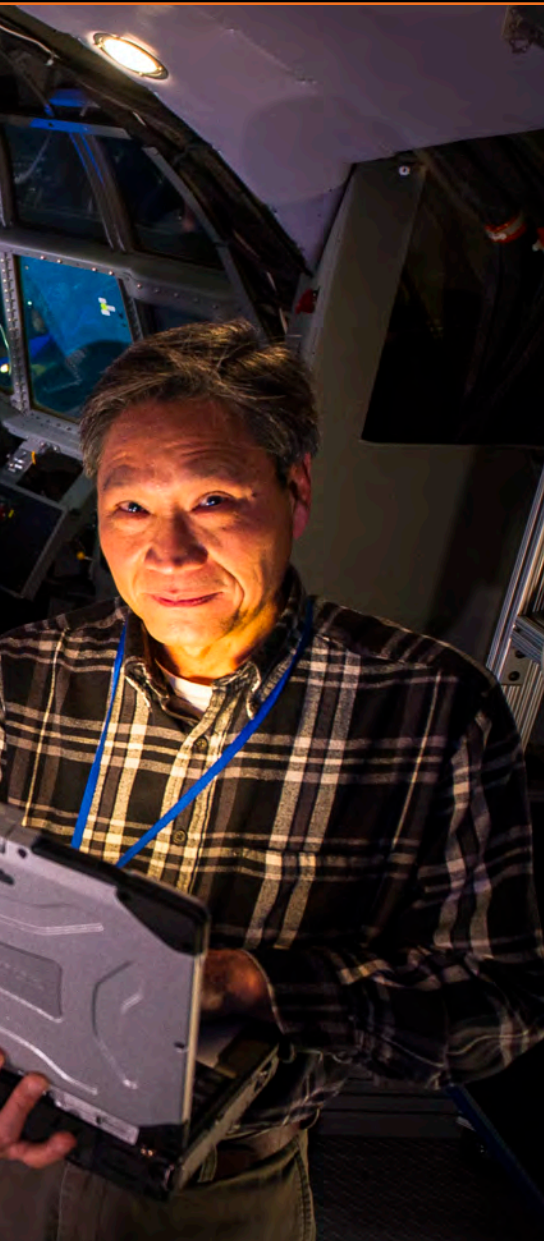
Mike Less, a senior engineer for the B-1 program, rarely used to meet personally with the Air Force customer at Tinker. That was before he, along with hundreds of other Boeing employees in the B-1 and C-130 programs, began their move from offices in Long Beach, Calif., to the Oklahoma City site.

"I'm doing the same work I was doing there," Less said. "We just moved my desk 1,300 miles (2,100 kilometers) east. Now



PHOTOS: (Clockwise from top left) In the C-130 Avionics Modernization Program (AMP) simulator cockpit, Systems Engineering engineers Rickey Gentry, background left, and Dana Noble try the controls while Vu Le, foreground, an electrical engineer, works with the aircrew laptop; the site's virtual flying simulator allows engineers Molly Meyers, left, and Ray Upp to virtually try out different cockpit control layouts; engineers Hiram Vega, from left, Jay Gramling and Stephanie Dozier review the KC-135 program's original handwritten notes and the new 3-D fuselage model they created with help from the decades-old design documents; Gentry looks through the head-up display while flying the C-130 AMP simulator; a view through the co-pilot's head-up display in the C-130 AMP simulator.

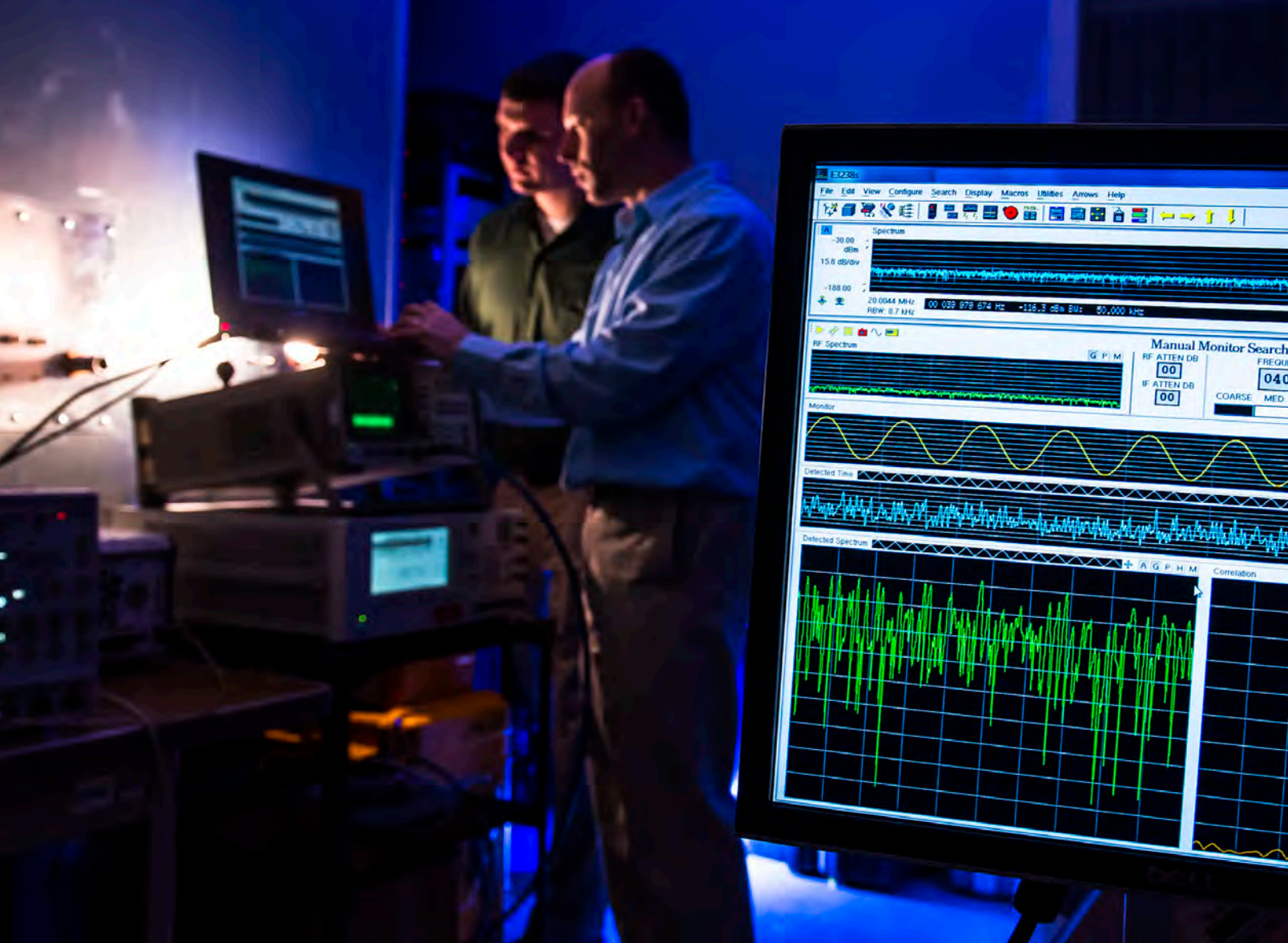




“We’re bringing in a lot of talent and engineering excellence. Excellence breeds more excellence.”

– Mark Reap, an embedded software engineer for the B-1 program





“It’s going to save programs; it’s going to save jobs. It’s going to save Boeing money, and it’s going to save the customer money.”

– Cynthia Hudspeth, B-52 marketing and sales, on gathering engineering talent in Oklahoma City

we can go over there to Tinker or they can come over here for meetings.”

Less, who spent 36 years in Southern California working for legacy company Rockwell International and Boeing, said he’s been warmly welcomed by his new co-workers and neighbors in Oklahoma City. While it’s still a relatively small site within the company, it hosts a wider variety of programs, which means more opportunities for employees.

Mark Reap, an embedded software engineer for the B-1 program, has spent more than 20 years in Oklahoma City. Like others who have worked at the site for years, he said the sudden burst of growth and relocation of engineers from California and Kansas has benefited the programs hosted there.

“Now we have a lot more resources to draw from, a lot more people,” he said. “It’s nice we’re bringing in a lot of talent and engineering excellence. Excellence

breeds more excellence.”

Gathering that engineering talent in Oklahoma City also will reduce overhead on the programs supported by the site, said Cynthia Hudspeth, B-52 marketing and sales, who recently moved to Oklahoma City after working for 14 years in Wichita. That’s not a trivial matter during this age of reduced military budgets.

“It’s going to save programs; it’s going to save jobs,” she said, while acknowledging that not all employees from California and Wichita have ended up making the move.” It’s going to save Boeing money, and it’s going to save the customer money.”

Many of the engineers at the Oklahoma City site mention their satisfaction in supporting military aircraft with long, proud histories—and aircraft that are expected to keep flying for decades to come. That means using 21st-century technology to address issues as they come up on aircraft that often date to the middle of the last

Signal presence



Boeing's site in Oklahoma City supports a wide range of engineering and aircraft programs, but it also has a particular expertise—electromagnetic effects (EME).

The site is seen as a Center of Excellence for TEMPEST, as four Boeing engineers at the Oklahoma City site now have TEMPEST certifications. It's a large number considering fewer than 100 people in North America hold such certification to test, design and approve work performed on classified systems, from computer hardware to airplane communications equipment.

TEMPEST, a U.S. government-administered program, refers to the study and mitigation of unintentionally emitted signals from electronic equipment that, if intercepted, could disclose sensitive information.

The TEMPEST-certified engineers and their colleagues in the EME group at the site work for both Boeing Defense, Space & Security and Commercial Airplanes, explained EME engineer John Mitchell. In the past decade,

the group has doubled to more than 30 engineers to handle the growing demand for their services. In addition to supporting military aircraft in need of secure communications and nuclear hardening, the program has recently contributed to aircraft programs as diverse as the 787 Dreamliner and the 737 Airborne Early Warning & Control aircraft.

"The advantage for us and Boeing as a whole is that we can learn from programs we work on, take those lessons and apply them to other programs," said EME engineer Jared Hanan. For example, he said, some lessons learned from the Enhanced Medium Altitude Reconnaissance and Surveillance System are being applied to the KC-46A Tanker program, Boeing's next-generation 767 tanker that is being developed for the U.S. Air Force as a replacement for the aging KC-135.

— Eric Fetters-Walp

century. Jay Gramling, a stress engineer for the KC-135 program who grew up just outside Oklahoma City, said his team, for example, recently created a 3-D model of the KC-135's entire airframe, a project that included referring to notes handwritten by Boeing engineers in the 1950s, when the aircraft was first designed.

"We're now replacing parts that often have never been replaced before," said Keith Gray, a product review engineer who works on base at Tinker in support of the KC-135, B-52, B-1 and E-3 aircraft. That can present unique challenges, but he credits the engineering team for its

PHOTOS: (Above) Josh Haines, background, and Jared Hanan, both Electromagnetic Effects (EME) engineers in the site's EME/TEMPEST lab, analyze and discuss test data. (Right) Engineers Jeremiah Hatten, foreground, Haines, background left, and Hanan in the EME/TEMPEST lab.



“Oklahoma certainly wants this to be a center for aerospace engineering expertise. They’re doing a lot to create a good, pro-business environment here.”

– Richard “Rick” Bach, a B-52 avionics engineering manager





ability to tackle unique maintenance issues in addition to working on ongoing modernization contracts.

Boeing's expansion in Oklahoma City comes as the city itself has seen an upswing. The metropolitan area of 1.3 million people was called the most "recession-proof city in America" in 2008, and good times for the energy sector and the city's efforts to diversify its economy seem to have paid off. Goo said Boeing's well-known name and its size have captured the attention and respect of local leaders.

Richard "Rick" Bach, a B-52 avionics engineering manager, also moved to Oklahoma City recently from Wichita.

"Oklahoma certainly wants this to be a center for aerospace engineering expertise," Bach said, adding: "They're doing a lot to create a good, pro-business environment here." He pointed to tax credits designed to attract engineers and other educated workers to the state.

Amid the site's "tremendous" growth, according to Goo, employees want to make sure the site creates its own culture—one that encompasses the large number of engineers moving from other sites. "We're spending a fair bit of time and attention on envisioning what we want that culture to be and then taking steps to build it," he said.

Goo and others also want to make sure everyone across Boeing knows about the site's core of engineering expertise and how it can serve programs across the enterprise.

"There is a lot of potential for Oklahoma City," said Darren Stout, Commercial Airplanes Electromagnetic Effects Support Team lead. "We tend to be not only the nation's best-kept secret but also Boeing's best-kept secret." ■

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PHOTOS: (Top row, from left) Pictured are Rick Bach, from left, and Cherri Thomas, Chris Engel and Lee Anne Jahansooz, Joe Lancaster and Ed Naranjo, all in the site's B-52 System Integration Lab. (Far left row, from top) Debasish Barua, foreground, and Nancy Webb; Chandler Duong, left, and Nat Pham; Darren Stout, left, and Thuy Pham. (Near left) In the B-52 System Integration Lab, where flight software and avionics are integrated and tested prior to being installed on the aircraft, are Bach, far left, and Thomas at the computer; Engel, background, from left, and Jahansooz, Naranjo and Lancaster (kneeling); Barua, foreground left, and Webb.



Lease leader

Airplane lessor GECAS has taken a disciplined approach to the top

By Tim Bader



“Our presence in China has been vital in securing more than 190 airplane commitments from airlines in the region.

— Norm Liu, GECAS president and chief executive officer

PHOTO: GECAS

GRAPHIC: (Above) An artist's concept of a 737 MAX 8 in GECAS livery. GECAS focused on advanced, fuel-efficient airplanes at the 2012 Farnborough International Airshow, with a commitment for 75 737 MAX 8s. BOEING

The leasing industry is full of companies known by their acronyms rather than their full, formal names. Few, if any, are as recognizable as GECAS.

There is a good reason GECAS, or GE Capital Aviation Services, has become a household name in the aviation industry. It is the leasing industry's largest lessor and lender in size, revenues, income and fleet value. The airplane-leasing and finance company, based in Stamford, Conn., owns and services more than 1,700 airplanes for more than 225 customers worldwide.

GECAS obtained the top spot with a disciplined financial and risk-management approach to acquiring and managing airplanes, according to Norm Liu, GECAS president and chief executive officer.

“We invest with caution, since there is only so much sensible business in the marketplace today,” said Liu, explaining that GECAS spends approximately \$7 billion annually on new airplanes, debt financing and sale-and-leaseback deals.

At last year's Farnborough Airshow in the United Kingdom, GECAS ordered 75 Boeing 737 MAX jets. The MAX, now in development, will have new fuel-efficient engines and other improvements that will save customers money.

GECAS has maintained its leadership position despite competition from an increasing number of lessors, especially from Asia. They are attracted to the fast-growing leasing market, which is expected to increase from 38 percent of airplanes in service today to 50 percent by 2020, according to Ascend Online.

Bill Collins, vice president for Leasing and Asset Management Sales at Commercial Airplanes, said GECAS is unique in that it is a top leasing company but also a leading debt financier with top-tier ratings. And its parent, General Electric, is a major aircraft engine supplier.

“GECAS goes beyond just aircraft finance,” Collins said. “It's a top spare engine lessor and provides consulting

services in areas such as airport infrastructure across the globe.”

Besides offering a variety of services, GECAS has a worldwide footprint, Liu added, noting airlines prefer local, more personal service rather than drop-by visits.

“At our scale we can afford a global presence and have established 25 offices worldwide,” Liu said. “Our presence in China has been vital in securing more than 190 airplane commitments from airlines in the region. Having offices in Africa, Russia and the Middle East helped establish our market leadership in those regions.”

But the success of GECAS also is a measure of its experience, Liu said. Few companies can match its 40-plus years in the leasing business.

“We have learned lessons when it comes to ordering airplanes and doing sale-leasebacks,” Liu said—lessons that will continue to serve GECAS well in an increasingly competitive market. ■

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Wrap star

An employee's passion for the environment helps keep tons of waste out of landfills

By Patrick Summers and photo by Mike Goettings



In this Frontiers series that profiles employees talking about their jobs, environmental specialist Scott Lowry of the Environment, Health and Safety group talks about the Mesa, Ariz., site's aggressive efforts to reduce, reuse and recycle waste.

I began recycling at a very young age. As a kid growing up in Washington state, I remember setting out five different bins at the curb for the recycling guys. At the time, you had to separate everything—white glass from brown glass from green glass. I learned the value of recycling early and it was a normal part of my family's life. It was natural for me to bring my enthusiasm for conserving and reusing natural resources to Boeing.

Today, I'm the leader of the Mesa Green Team—Boeing Employees for Environmental Protection. It's a unique opportunity to focus my time and attention on something I feel truly passionate about—protecting the environment, and finding ways for Boeing employees to help the environment.

The strong support we get at Mesa for our recycling activity says a lot about Boeing's commitment to the environment. We improved our recycling program by first focusing on traditional materials, such as scrap metal and cardboard, then adding items such as bubble wrap and other soft plastics that help protect many of the parts we use to build the Apache and other Boeing products. My co-workers seem surprised when I tell them how much material we recycle here at the Mesa site—more than 1,000 tons (900 metric tons) in 2012, a weight equivalent to 120 Apache helicopters!

We're lucky to have a site leader at Mesa who is a strong advocate for our environmental programs. It was Tony Ham's idea to create a full-time Green Team leader position ... the only job like it at Boeing. Tony gives us a lot of support as we continue to grow and expand our plans to reduce, reuse and recycle as much material as possible.

The investment has paid off. Five years ago, the Mesa site recycled about 26 percent of its solid waste and available material; today it's nearly 60 percent. And it's not just recycling. We're able to identify a lot of surplus items that can be reused by Boeing, donated to local nonprofits or sold.

It's very satisfying to walk by a recycle container and see it full because you know co-workers are taking that simple step to put things where they belong instead of sending them to a landfill. Every one of us can make a difference. ■

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FIVE OF A KIND

Ryanair, the Irish low-cost carrier and Boeing's largest 737-800 customer, with 348 deliveries since 1999, last month announced a commitment to order an additional 175 of that model to support future growth. Shown here are the 146th, 147th, 148th, 149th and 150th 737s for Ryanair, parked in formation at Boeing Field in Seattle in 2007, while being prepared for delivery. PHOTO: MARIAN LOCKHART/BOEING





OPEN Innovations come from great ideas, and great ideas grow from an open work culture. Our desire to be better is what drives us every day. The next big idea could come from any one of our 174,000 employees, and we couldn't be prouder.

