



Frontiers

www.boeing.com/frontiers

AUGUST 2013 / Volume XII, Issue IV

FOCUSED ON SAFETY

Boeing employees 'Go for Zero'
injuries at their workplaces



“We were challenged to design a better winglet—the MAX AT winglet will save airlines millions of gallons of fuel.”

Walt Howard
Manager, Product
Development Group
Boeing Commercial Airplanes

BETTER WINGS FOR
A BETTER PLANET

Stories of
innovation
at Boeing



www.boeing.com/stories



15 LOOKING OUT FOR ONE ANOTHER

Whether they are performing safety drill training near Taft, Calif., for transferring potentially dangerous rocket fuel, maintaining military helicopters in Queensland, Australia, or working on the 767 production line in Everett, Wash., Boeing employees everywhere should expect to go home at the end of their workday the way they started—injury-free. And they understand the importance of looking out for themselves and one another when it comes to safety. Ray Conner, Commercial Airplanes president and CEO, and Dennis Muilenburg, Defense, Space & Security president and CEO, recently sat down with *Frontiers* to discuss their views on safety and the new “Go for Zero” effort to eliminate all workplace injuries.

COVER: JOHN ENGSTRAND OF BOEING'S SATELLITE PROPULSION TEAM WEARS A PROTECTIVE SUIT, AS DO OTHER MEMBERS OF THE TEAM IN THE BACKGROUND, DURING SAFETY DRILL TRAINING NEAR TAFT, CALIF. BOB FERGUSON/BOEING

PHOTO: PROPULSION LOAD OPERATORS ERNIE TAMAYO, LEFT, AND JEREMY BOJORQUEZ PERFORM ADJUSTMENTS DURING SAFETY DRILL TRAINING NEAR TAFT. BOB FERGUSON/BOEING



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

Inside cover:



“Better Wings for a Better Planet” is one in a series of innovating stories told by Boeing employees such as Walt Howard. Learn more at www.boeing.com/stories.

Page 6:



The Chicago Air & Water Show is held every summer on the shore of Lake Michigan in Chicago. The largest free event of its kind, viewed by crowds averaging

2 million, the show features aerobatics demonstrations and precision formation flying and parachute teams. Boeing is one of the sponsors.

Pages 22–23:



This ad from the “Partners Across Generations” campaign highlights the relationship

between Boeing and China’s aviation industry. Translation: *Over time, ways of travel become more convenient and faster. Throughout the past 40 years, Boeing has been a close partner of Chinese aviation, providing high-quality airplanes and service and expanding the horizon for generations of Chinese. Boeing remains committed to this partnership.*

Back cover:



This ad recognizes the Indian Navy following delivery of its first P-8I long-range multi-mission maritime aircraft, which adds a significant capability for India. The ad appears in July and August issues of Indian trade publications.

FSC LOGO

Publisher: Tom Downey
Editorial director: Anne Toulouse

EDITORIAL TEAM

Executive editor:
Paul Proctor: 312-544-2938

Editor:
James Wallace: 312-544-2161

Managing editor:
Vineta Plume: 312-544-2954

Graphic designers:
Al Callanta: 310-364-6743
Brandon Luong: 312-544-2118
Cass Weaver: 480-216-4539

Photo director:
Bob Ferguson: 312-544-2132

Commercial Airplanes editor:
Cecelia Goodnow: 206-766-2931

Defense, Space & Security editor:
Diane Stratman: 562-797-1443

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

Human Resources and Administration editor:
Len Vraniak: 312-544-2351

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

Staff writer:
Eric Fetters-Walp: 425-266-5871

ONLINE PRODUCTION

Web manager:
Wendy Manning: 312-544-2936

Web designer:
Michael Craddock: 312-544-2931

Web developer:
Lynn Hesby: 312-544-2934

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

HOW TO CONTACT US:

E-mail:
boeingfrontiers@boeing.com

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

Phone:
312-544-2954

Fax:
312-544-2078

Web address:
www.boeing.com/frontiers

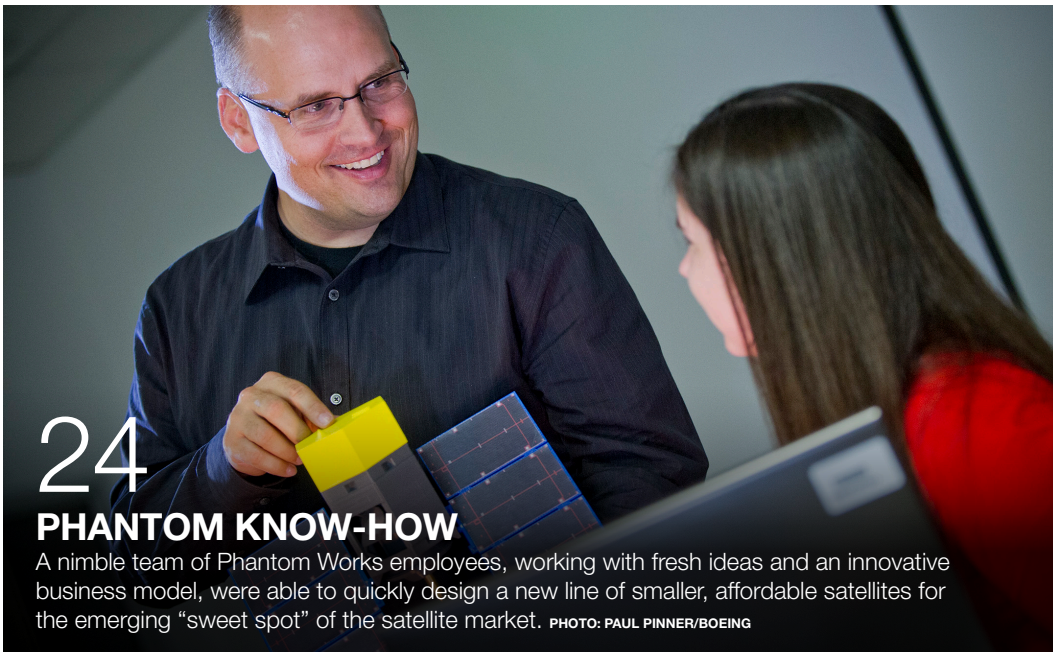
Send all retiree address changes to
Boeing Frontiers, MC 6Y-66
P.O. Box 3707
Seattle, WA 98124-2207

Postmaster: Send address corrections to
Boeing Frontiers, MC 6Y-66
P.O. Box 3707, Seattle, WA 98124-2207
(Present addressees, include label)



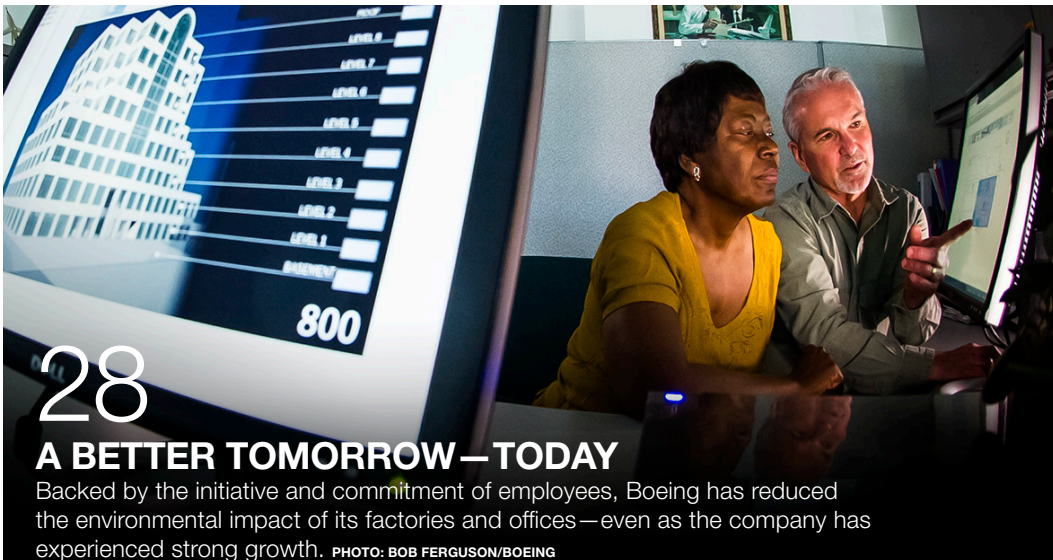
HISTORICAL PERSPECTIVE

It was one of the more unusual aircraft in aviation history. Developed by McDonnell Aircraft, the XF-85 Goblin manned jet fighter was designed to be carried inside a bomber and dropped from the bomb bay if enemy fighters threatened. PHOTO: BOEING ARCHIVES



PHANTOM KNOW-HOW

A nimble team of Phantom Works employees, working with fresh ideas and an innovative business model, were able to quickly design a new line of smaller, affordable satellites for the emerging "sweet spot" of the satellite market. PHOTO: PAUL PINNER/BOEING



A BETTER TOMORROW—TODAY

Backed by the initiative and commitment of employees, Boeing has reduced the environmental impact of its factories and offices—even as the company has experienced strong growth. PHOTO: BOB FERGUSON/BOEING

Inside

07

LEADERSHIP MESSAGE

Working hand in hand with Boeing's business units, Phantom Works is helping break the growing cost curve of development programs—which can price new programs beyond customer budgets, says Phantom Works President Darryl Davis. Employees, he writes, thrive on the challenge of figuring out how to do things that no one else can.

08

SNAPSHOT/ QUOTABLES

10

WHY WE'RE HERE

14

CUSTOMER PROFILE

36

MILESTONES

42

IN FOCUS

32

POWER COUPLE

The relationship between Russia and Boeing formally began 20 years ago with the opening of a Boeing research center in Moscow. The relationship has continued to grow—as have orders for Boeing jetliners from Russian airlines. PHOTO ILLUSTRATION:

BRANDON LUONG/BOEING; KREMLIN PHOTO: SHUTTERSTOCK; AIRPLANE GRAPHIC: BOEING



ABOVE AND **BEYOND**

We are proud to sponsor the
Chicago Air & Water Show.



Turning ideas into reality, affordably

Employees thrive on the challenge of making the impossible possible through innovation, collaboration

Darryl Davis

President, Boeing Phantom Works

Engage to understand, innovate to compete, prototype to win. That's how Phantom Works does business, and it's how we're working closely with our Boeing business partners to break the development-cost curve that threatens to price any new program beyond the reach of customers' budgets.

Being at what I like to call the "pointy end of the spear" in our business means it's our responsibility to learn what our customers need; discover how to satisfy those needs; and demonstrate the capability, service and affordability only Boeing can offer. Hand in hand with the other Boeing Defense, Space & Security business units, as well as Boeing Commercial Airplanes and Engineering, Operations & Technology, we position people, processes and technology to the best advantage for the company, our customers and our shareholders.

Sometimes we focus on completely new products. Other times we look to extend established franchise programs. We encourage, appreciate and depend on the contributions of employees across the enterprise to support these efforts. (Joining the DreamStarter conversation on inSite, for example, is just one of many ways employees can become engaged.)

Recently we introduced Phantom Phoenix, a family of small satellite prototypes that completes the Boeing range of satellites. (See Page 24.) Quickly and collaboratively, as this story shows, we're working to break the myth that the next satellite, next airplane or next technology will cost more than the last.

It's exciting to see empowered teams dig in, raise development to the next level, and turn ideas into reality for the benefit of our customers. Every program informs and influences our next opportunity; that leads to future business and creates entirely

"We're working to break the myth that the next satellite, next airplane or next technology will cost more than the last."

new global market opportunities. Our customers acknowledge that we're stepping out in this way. They appreciate that we're bearing the risk instead of them having to do so.

With risk comes uncertainty. Phantom Works employees thrive on a challenge, a bar set high, the opportunity to do things no one else has figured out how to do, to accomplish what seems impossible. We learn every minute we are building and testing new ideas—not only when we succeed but when we fail. Doing things differently occasionally means failing, but sometimes that's the only way to innovate.

Ever since I set off in this business 30 years ago I wanted to be building and testing things—and our Phantom Works team today is no different. What we do is exhilarating and a source of great personal and professional reward. That's especially true when we know the Boeing enterprise supports Phantom Works' efforts to engage, innovate and prototype, and that our customers value all the exciting developments that Boeing brings to the marketplace. ■

PHOTO: BOEING

Ready for the long haul

Garuda Indonesia's first Boeing 777-300ER (Extended Range) awaits delivery at the Everett, Wash., Delivery Center early last month. The airline has ordered 10 of the twin-aisle, long-haul jets, which will be a key component of Garuda Indonesia's Quantum Leap fleet revitalization program. Garuda Indonesia is the flag carrier of Indonesia, operating more than 80 airplanes and serving 33 domestic and 18 international destinations in Asia, Australia and Europe. PHOTO: COLLEEN PFEILSCHIEFTER/BOEING





“How thrilled my parents would be if they could see this today.”

– Bill Boeing Jr., son of the company’s founder, after visiting the Everett, Wash., factory and seeing the high volume of airplanes currently being produced. Boeing, now 90, also spoke with members of the 2013–2014 class of the Leadership Development Excellence Program. Boeing News Now, June 28

“Tuck this moment away in your heart ... we’re going beyond Earth’s orbit again ... and this is the beginning.”

– NASA Associate Administrator William Gerstenmaier, speaking at the Michoud Assembly Facility in New Orleans during a ribbon-cutting for a major Boeing welding tool to be used in production of the Space Launch System, NASA’s next heavy-lift rocket. Boeing is building the rocket’s core stage. Boeing News Now, June 25

“It could ripple throughout the aerospace industry and change the way we do business.”

– Stephen Gaddis, program manager of the Game Changing Development Program at NASA’s Langley Research Center in Hampton, Va., talking about the successful testing of a large, lighter-weight and less expensive cryogenic fuel tank developed by Boeing and made of composite materials. Huntsville Times, July 2



Managing a 'masterpiece'

This employee helps keep 737 MAX development on track

By Lauren Penning and photo by Marian Lockhart

As a member of the 737 MAX Business Operations team, Veronica Wipp helps airplane developers manage and integrate the thousands of details that go into creating Boeing's new single-aisle airplane. In this Frontiers series that profiles employees talking about their jobs, Wipp describes her enthusiasm for turning data points into a real commercial airplane.

I have a rewarding job because at the end of a development program you have a beautiful airplane that people will fly every day. My job is to coordinate, analyze and integrate all the details that keep development of the 737 MAX on track, and I feel a great sense of ownership in that.

In my 16 years with Boeing I've always supported development programs, working on the next new airplane. I thrive off the challenge—that edge to do better than the last time. I started my career in retail, but at the end of the day I didn't feel an overall sense of accomplishment because I didn't see any impact from what I did. Working in the airplane development environment constantly motivates me because I see the progress the team is making every day.

On the MAX I am responsible for our Management Information System, which keeps the program performing efficiently and according to plan. Even in a task that seems simple, like putting together a chart, I strive for perfection. Because it's not just about the numbers. A chart does not always show you the big picture. To keep the program moving forward everyone needs to understand what's driving the data. As the integrator of all this data, I've learned how to ask the right questions of the team, to pull together a complete picture of how the project is coming together.

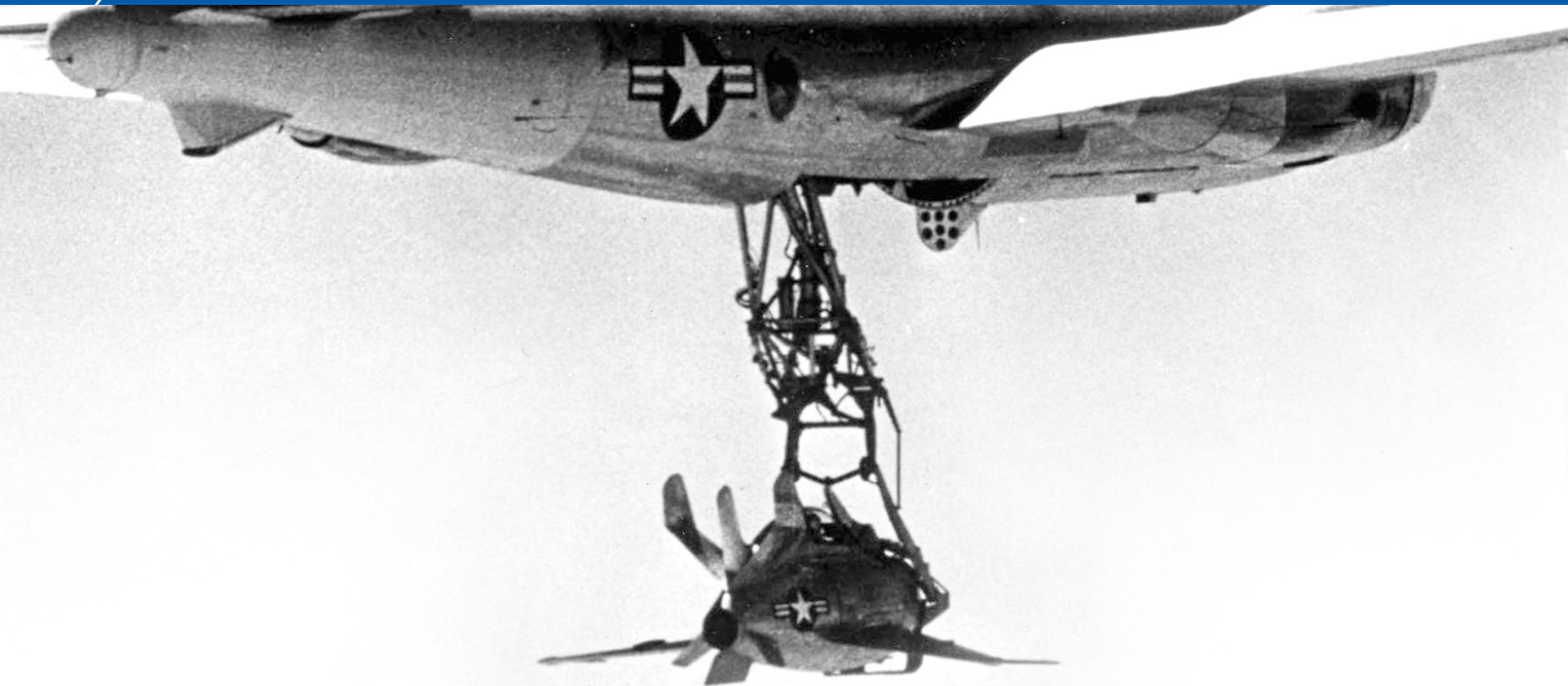
That's why I see the final deck of charts that show our weekly performance as a masterpiece. Everyone on the team has contributed to the overall picture of the progress being made. At the end of our weekly program reviews, I can see everyone's efforts come into focus. I can proudly say, "What a great week our team has accomplished," and that is really satisfying.

"Working in the airplane development environment constantly motivates me because I see the progress the team is making every day."

— Veronica Wipp

This feeling of accomplishment for me extends beyond the office. When I see an airplane flying overhead—many of them from development programs I contributed to—I feel inspired. And when the 737 MAX takes to the sky, I'll know that I was a part of getting that airplane off the ground. And that is a tremendous feeling. ■

lauren.l.penning@boeing.com



The *fighter* within

McDonnell Aircraft's XF-85 was one of the most unusual fighters in aviation history

By Henry T. Brownlee Jr.



In the spirit world, a goblin is a small, bizarre-looking creature considered malicious and mischievous. It was the perfect name for the strange-looking and diminutive aircraft that attached itself to a mother ship like a parasite.

Developed by Boeing heritage company McDonnell Aircraft Corp. in the early 1940s, the XF-85 Goblin jet fighter was to be carried by the new long-range B-36 bomber, and if the host ship were attacked the Goblin would be launched from the bomb bay to protect it. Afterward, the Goblin would be retrieved by the bomber like a trapeze artist.

That was the idea.

As it turned out, the Goblin was not long for this world.

The story of the Goblin began in 1941, during World War II, when the U.S. Army Air Force's strategy was to develop a next-generation, long-range, intercontinental bomber designated the XB-36. But given the massive, six-engine bomber's range, fighters would not have enough fuel to escort the bomber on its missions.

In 1942, the Army Air Force initiated Project MX-472 to find a solution. Several unconventional options were explored. One was a manned "parasite" fighter that could be carried aboard the large bomber. The concept was not new. In the 1930s, the U.S. Navy had briefly experimented with the Curtiss F-9C Sparrowhawk, a biplane fighter, carried

The Goblin was a “parasite” fighter that would be carried by the mother ship, a long-range B-36 bomber.



aboard the airships USS *Akron* and *Macon*.

McDonnell Aircraft responded to the Army Air Force's request for proposals with four versions of its Model 27 and received an engineering development contract in October 1945. McDonnell engineers worked within the constraints of developing a jet fighter less than 15 feet (4.5 meters) long and 5½ feet (1.7 meters) wide that could carry standard armament. The final configuration was the Model 27E, designated the XF-85. It was a single-seat, midwing jet fighter with folding sweptback wings and an X-shaped tail. The XF-85 was equipped with four .50 caliber machine guns with 300 rounds each and one Westinghouse J-34 engine that supplied 3,000 pounds (13 kilonewtons) of thrust.

The XF-85 did not have landing gear. Instead, it had a skid for emergency landings. It also had a retractable “skyhook” in the forward fuselage that would latch onto a “trapeze” extended from the bottom of a B-36 bomber after the fighter had completed its job of protecting the bomber.

And the pilot would have an ejection seat.

The egg-shaped fighter was called the Goblin because James McDonnell, founder of McDonnell Aircraft, had previously decided to name the company's jet fighters from the spirit world. The Phantom and Banshee were the first two. Third was the XF-85 Goblin.

McDonnell Aircraft received the go-ahead in 1947 to build and test two

XF-85s. But no B-36 bomber was available for the tests so a Boeing EB-29 was selected as the mother ship. Nicknamed “Monstro” by its crew, the EB-29 was retrofitted with an arresting trapeze to lower and then retrieve the XF-85 from its bomb bay.

The first fully released flight of the XF-85 came on Aug. 23, 1948, at Muroc (now Edwards Air Force Base, Calif.). Lowered by the trapeze from the EB-29 flying at 20,000 feet (6,000 meters) altitude, McDonnell test pilot Ed Schoch released the Goblin. In flight, the Goblin was stable and easy to fly. After a 10-minute flight, Schoch made three unsuccessful attempts to reconnect the XF-85 to the arresting trapeze. But the small jet was buffeted wildly by the big bomber's turbulence. On the last attempt, the Goblin hit the trapeze with such force that the canopy was smashed. But the pilot managed to make a belly landing, using the Goblin's skid, on the dry lake bed at Muroc.

Schoch did successfully connect the Goblin to the arresting trapeze of the EB-29 on his next attempt on Oct. 14. Ultimately, only three of seven flights of the XF-85 Goblin resulted in successful connections with the arresting trapeze.

The XF-85 Goblin test program was canceled in 1949. One never flew from a B-36. Docking with the mother ship had proved too difficult. But the

Goblin was no longer needed: In 1949, Boeing's KB-29P, with its flying boom aerial refueling system, solved the problem of long-range jet fighter escort for bombers. ■

henry.t.brownlee-jr@boeing.com

Learn more about the XF-85 Goblin and see a video at www.boeing.com/boeing/history/mdc/goblin.page.

PHOTOS: (Opposite page, top) The XF-85 Goblin was deployed from the host aircraft using a retractable “trapeze” that was extended in-flight from the bomb bay. For recovery, the fighter carried a retractable hook in its forward fuselage and would fly up to and latch onto the trapeze. (Opposite page, bottom) A mock-up of the XF-85 being tested with the wings folded to fit inside the parent aircraft. U.S. AIR FORCE (This page) McDonnell built two prototype XF-85 Gobblins. This one made the first flight from a Boeing EB-29 bomber on Aug. 23, 1948.

BOEING ARCHIVES

Climate of success

Russian airline UTair in Siberia is expanding with new Boeing jets

By Elena Alexandrova



Winter lasts seven months in Surgut, one of the oldest cities in Siberia and now a center of oil and gas production. Temperatures can plunge to 40 degrees below zero (minus 40 Celsius)—not ideal flying conditions.

But UTair Aviation's fleet of Boeing 737s is well-equipped to operate in severe cold, enabling the ambitious and growing airline to offer service throughout Siberia while expanding to multiple destinations in Europe, Asia and Africa. The airline's network of commercial flights covers 90 percent of the vast Russian territory, which is 1.7 times the size of the United States.

The airline recently ordered 40 new Next-Generation 737s.

"Boeing delivers us what we need—simplicity, reliability and low-cost airplanes," said Chief Executive Officer Andrei Martirosov.

Wintry Surgut is home base for the UTair Group, a family of aviation-related companies providing passenger and cargo transport, maintenance and repair, flight services, and training. Its helicopter fleet, which UTair Group says is the world's largest, operates commercially around the globe; it also is used extensively in United Nations peacekeeping missions. Boeing 737s play a supporting role in those missions, transporting people and goods to the Republic of Liberia and the Republic of Sudan.

Last year UTair Aviation transported more than 8 million passengers to 110 destinations, making it the third-largest carrier by passenger count and the second-largest operator of domestic

flights in Russia. The airline maintains its central hub at Vnukovo International Airport in Moscow, where about 100 of its flights depart each day.

Boeing and UTair have been working together since 2006, when the airline purchased its first 737-500. Today, its fleet of more than 240 airplanes includes 63 Boeing airplanes—51 737s, nine 757s and three 767s. The airline says fleet expansion and modernization has enabled UTair to open more than 30 new routes to Russian and international destinations in the past year.

The 2011 Paris Air Show set the stage for an even closer partnership as UTair announced its first direct order of Boeing airplanes. All 40 airplanes—seven 737-900ER (Extended Range) jets and 33 737-800s—will feature the Boeing Sky Interior. First delivery is scheduled for fall 2013.

"Our decision to further expand our Boeing fleet of 737s is based on the Next-Generation 737's proven efficiencies. And our passengers will enjoy the new Boeing Sky Interior," Martirosov said.

That fits with UTair's stated mission: to provide passengers "reasonable airfare and a convenient route network ensuring a high level of safety, comfort and service." ■

elena.alexandrova@boeing.com

PHOTO: A Boeing 737-500 in UTair Aviation livery. The airline recently ordered 40 new Next-Generation 737s. **UTAIR AVIATION**



Zero-injury mentality

Eliminating all workplace injuries requires taking personal ownership of the safety culture at Boeing



Last month, all managers viewed a webcast hosted by Jim McNerney, Boeing chairman, president and CEO, focused on Boeing's commitment to eliminating all workplace injuries. Following the webcast, Frontiers sat down with Ray Conner, Commercial Airplanes president and CEO, and Dennis Muilenburg, Defense, Space & Security president and CEO, to discuss their views on safety as a Boeing value and the "Go for Zero" effort.

How have you personally been affected by workplace safety issues?

Conner: Safety has had a personal impact on all of us at Boeing, especially within the last nine months. Two of our employees, one in Seattle and one in Charleston, lost their lives to workplace accidents—ones that could have been avoided. Both employees came into work just like every other day, and in minutes, their lives, their family's lives and the lives of everyone they touched, including their teammates, changed in a flash. It shouldn't take a tragedy like this to wake us up and make us realize we need to be more mindful of how we work and how we look out for one another. It's an impact that's close to home and something we'll never forget.

Muilenburg: Safety has always been important at Boeing, and it's important to me personally. The greatest reminder about safety I've had recently was during a visit to our Oklahoma City site following tornadoes that went through that area. Twelve of our

PHOTO: Signing the Boeing Safety Promise in St. Louis last month are John Tracy, from left, Boeing chief technology officer, and senior vice president of Engineering, Operations & Technology; Ray Conner, president and CEO of Boeing Commercial Airplanes; Jim McNerney, Boeing chairman, president and CEO; and Dennis Muilenburg, president and CEO of Boeing Defense, Space & Security. **RICH RAU/BOEING**



employees lost their homes. I visited with one of them, and he talked about taking action to keep his family safe, amid all the destruction, and how that kind of moment makes it so clear how much we value the lives of those around us. We're so thankful that they're fine. That conversation reminded me we must have that same sense of responsibility for the safety of our teammates either at work or home every day.

Going for zero injuries seems like an aspirational and possibly unattainable goal—after all, our five-year trend on injuries has gone steadily downward. Why are we setting that as a goal, and how do we set targets that move us toward zero?

Muilenburg: We don't see zero injuries as just being an aspirational goal. We expect to have zero injuries in the workplace. It's literal. Our people deserve to go home in the same condition in which they came in to work. We've done benchmarking with other major industrial leaders—companies that have safety records that are significantly better than ours—and we know that getting to zero injuries is possible. We have hundreds of examples throughout the company where that is also the case—so we know it's possible. This is all about getting that zero-injury culture and mentality into the business. In the end, that means each of us must accept the responsibility to look out for others, as well as to know and carefully follow all safety procedures.

“Go for Zero is not just some initiative or campaign; rather, it is about changing the culture in the business.”

— Dennis Muilenburg, Boeing Defense, Space & Security president and CEO

“No one gains anything from compromising safety standards and cutting corners ... More important, accidents take a toll in human suffering that I won’t accept.”

– Ray Conner, Boeing Commercial Airplanes president and CEO

Conner: We strive for a perfect safety record for our customers, so why wouldn’t we do the same for our own team? Many of our Commercial Airplanes employees are leading the way. Propulsion Systems has logged 2 million work hours over the course of more than a year without a single injury. Propulsion’s Renton value stream team has nine years without a lost-time work injury.

What assurances can you give that safety really is more important than meeting production schedules?

Conner: No one gains anything from compromising safety standards and cutting corners. I can tell you that a safety incident would cause far more disruption for production schedules than making it a priority in the first place. We have safety policies and procedures to protect our entire team. Just like we follow rigorous product quality and safety standards—we need to take them seriously and take care of each other and ourselves. Safety, quality and performance go hand in hand. More important, accidents take a toll in human suffering that I won’t accept.

What makes Go for Zero different from how safety has been treated in the past?

Muilenburg: Go for Zero is not just some initiative or campaign; rather, it is about changing the culture in the business. It builds on some of the work that we’ve done in the past. But it’s also about taking ownership of our safety culture, embedding it in how we do business every day, and making it personal so we’re all accountable for our own safety and the safety of our co-workers around us. This is really an important part of how we want to change the culture of the company.

What can teammates do to increase their ability to work safely together?

Conner: I can’t stress enough how important it is to make a conscious effort to look out for one another. Everyone expects to come to work and do their normal day-to-day jobs, but I believe predictability lulls us into a false sense of security. A common thread I’ve noticed among zero-injury teams is they purposely stay alert. They don’t become too comfortable. It’s a daily effort, and a culture they foster within their teams. When new employees join the team, they learn from the existing culture, which creates a powerful impact that’s carried by these employees throughout their career.

What’s the most important thing managers can do to drive a culture in which workplace safety is paramount?

Conner: We all want to keep our families safe, and that’s how we have to think about our teammates—like they’re family. We want them to go home safely at the end of the day, just like your family wants you to come home safely. It’s about accountability to each other as human beings. Managers need to ensure that safety is purposefully considered in everything we do as employees of Boeing.

What is the one thing you want employees or management to change related to workplace safety?

Muilenburg: Make it personal every day. Keeping people safe is not a metric or a number on a schedule; it’s the health or life of a friend, a mom or dad, a brother or sister, and it’s precious. ■

PHOTO: Dennis Muilenburg, left, and Ray Conner shake hands after signing the Boeing Safety Promise. **RON BOOKOUT/BOEING**



“This operation has been called by many one of the most dangerous jobs performed at Boeing.”

– Chad Margolin, propulsion test engineer



Be safe out there!

From loading dangerous rocket fuel to building a commercial jetliner, workplace safety always comes first

By Eric Fetters-Walp

Safety is part of everyone's job at Boeing. For Chad Margolin, Dale Lamason and their teammates, it's on their minds all the time as they handle explosive rocket fuel.

Their Satellite Propulsion team tests and fuels satellites. One of its responsibilities is to transfer potentially dangerous rocket propellants into satellite fuel tanks.

"This operation has been called by many one of the most dangerous jobs performed at Boeing," said Margolin, a 17-year employee of the Propulsion team, which is part of Engineering, Operations & Technology's Boeing Test & Evaluation organization. "We want to maintain a reputation that is positive and let everyone know that we are not minimizing safety in the interest of maximizing efficiency. We strive to do both, of course, but if there is a choice to be made, safety should always come first."

Because the potential consequences of an accident at an actual rocket launch site could be severe, Lamason said safety practices are rigorously followed and always improving. That's the case even during safety drill training at the team's facility near Taft, Calif., less than an hour's drive from Bakersfield. Even though the team uses safe substitutes instead of volatile items such as fuel during this training, their daily briefings include mention of any potential safety concerns. They conduct daily inspections for vapor leaks, which could emit toxic fumes if they occurred at a launch site. Employees are vigilant about keeping safety-related logbooks and records up to date.

"No one wants to lie in bed at night staring at the ceiling wondering if I could have done something simple to prevent an injury," Lamason said.

That is the same message behind "Go for Zero—One Day at a Time," Boeing's enterprisewide effort to eliminate workplace injuries and strengthen the company's safety culture.

While Boeing has made progress lowering the number of workplace injuries, with a 17 percent drop over the past five years, multiple incidents in the past 18 months have resulted in serious injuries and two employee deaths. In January, Boeing Chairman, President and CEO Jim McNerney launched a high-level task force, accountable to the Executive Council, to build the foundation for the Go for Zero effort and a new culture of workplace safety.

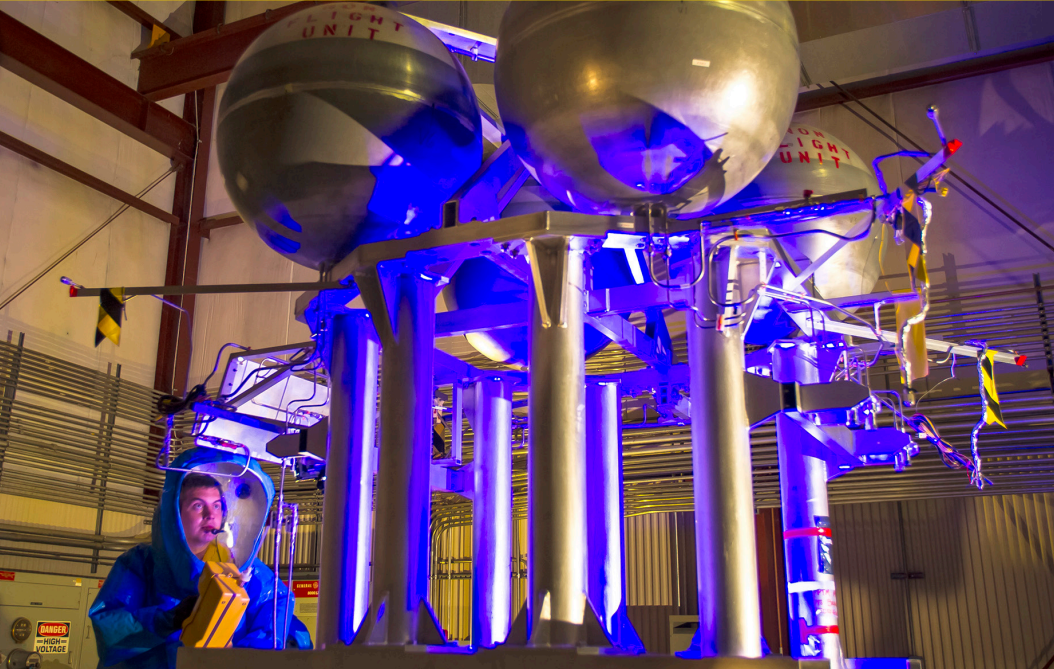
The Boeing Executive Council subsequently adopted four guiding principles aimed at eliminating workplace injuries and accidents:

- We value human life and health above all else and take action accordingly.
- All incidents, injuries and workplace illnesses are preventable.
- We are personally accountable and collectively responsible for each other's safety.
- In meeting our goals for quality, cost and schedule, we will not compromise safety.

Eliminating injuries and staying safe at work resonates with Boeing employees everywhere, whether they are loading rocket fuel on satellites near Taft, helping assemble commercial jetliners in Everett, Wash., or maintaining helicopters in Australia.

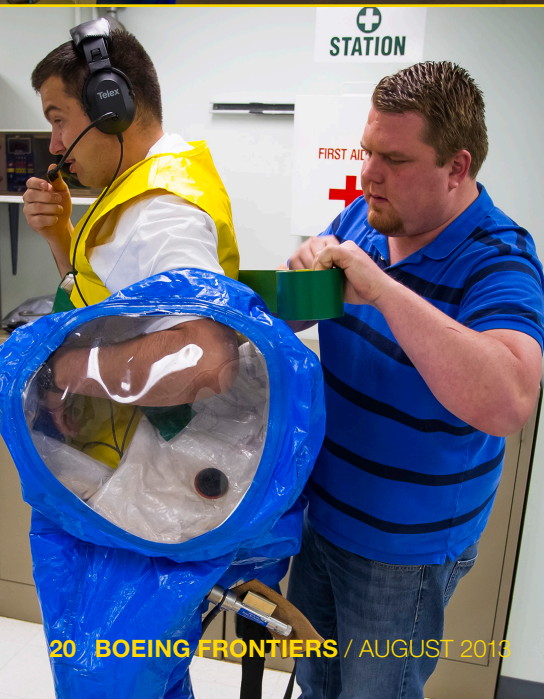
"Safety has always been at the forefront here. We all need a safe operating environment," said Tim Welsh, Kiowa team leader at the Oakey Army Aviation Centre

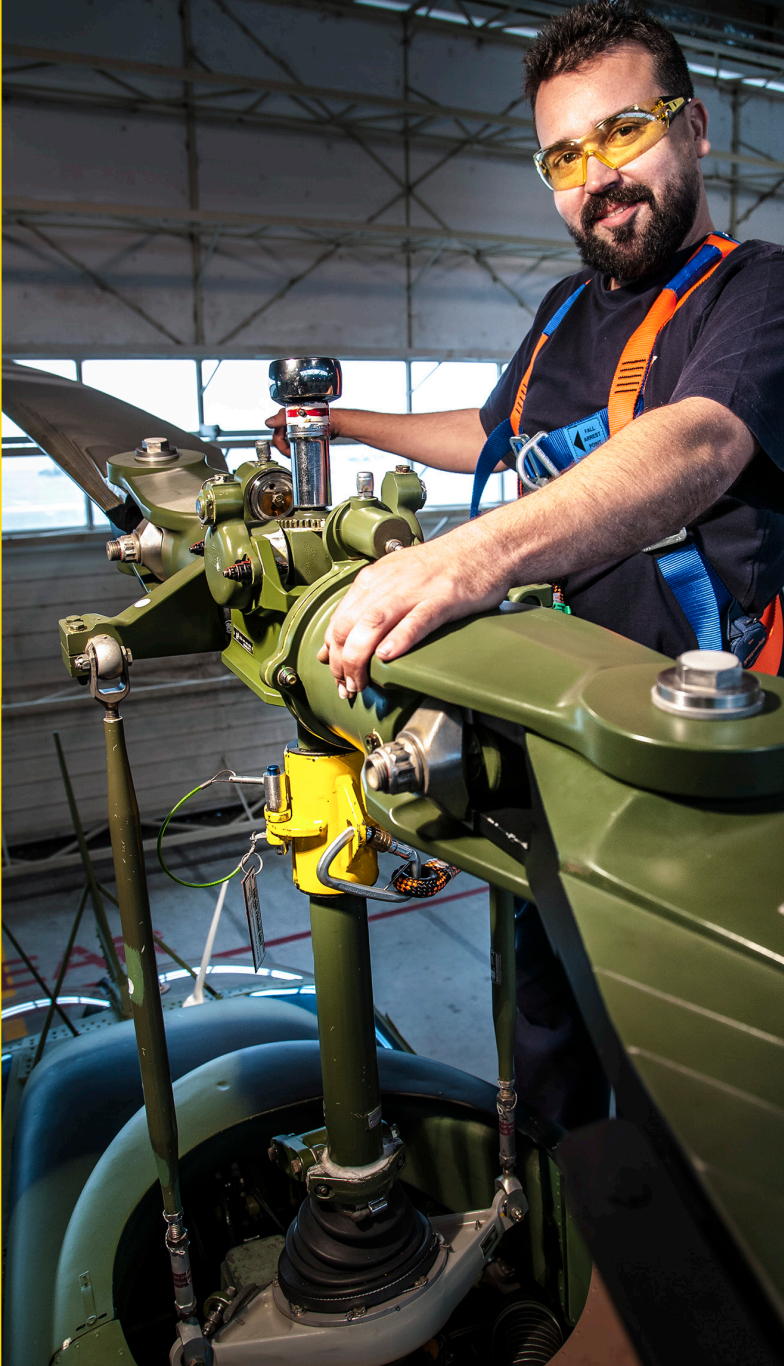
PHOTO: Propulsion Load Operator John Engstrand of Boeing Test & Evaluation's Satellite Propulsion team observes propellant load pressure as operators Ernie Tamayo and Jeremy Bojorquez check for leaks in the background. **BOB FERGUSON/BOEING**



“This is about everybody’s safety. You’re always thinking of better ways to do things, safer ways to do things.”

– Tim Welsh, Kiowa team leader





in Queensland, Australia.

Boeing Defence Australia's team at Oakey maintains Black Hawk and Kiowa training helicopters, and trains new army pilots and maintenance technicians. A change in Australian regulations last year required the use of proper fall protection when working high off the ground servicing helicopters.

"It means we couldn't go up on the aircraft and make adjustments," Welsh said. Instead, the helicopters had to be pulled into one of the center's hangars, where mechanics could use work stands to adjust rotorblades and other parts.

If a helicopter had to make an unscheduled landing due to an operational issue, following the new regulation became an even bigger issue. "We can't take work stands out to a farmer's field to remove the rotors when that happens," Welsh explained.

Simon Pettitt and Glenn Phillips, both aircraft mechanics at Oakey, developed a solution that meets the new regulation and improves safety. Consisting of a clamp that attaches to the rotor mast and a fall-arrest harness, the system won Australian Defence Force approval earlier this year and is now used regularly by the Boeing team.

"The reason it's made the work safer is because it gives you a secure anchor point on the aircraft on which to attach," Welsh said. "Also, you don't have to go up and down a ladder or platform all the time now."

Half a world away, on the 767 production line in Everett, rocket fuel and helicopter rotors are nowhere to be seen, but a safety mis-step still can lead to serious injury—including a hard strike to the head.

An open cargo door on the 767 fuselage is at just the right height for a mechanic to run into while working on the airplane. Mike Hurst, a team lead and safety representative, with help from his teammates and Dino Go of Boeing Research & Technology, found an inexpensive and effective way to call attention to the hazard: flashing LED lights that attach with suction cups to the open cargo door.

"The safety lights are useful not just for us, but also for visitors that come through," said Kim Wyeth, a 767/747 seal technician. "When we have visitors that are not familiar with this area, they are prone to hitting their head."

While improving safety on the job means putting on special equipment, making sure training is up to date, or even just taking an extra moment to make sure everyone knows how to avoid an incident, it's well worth the effort, Wyeth and other employees stress.

"This is about everybody's safety," said Welsh, the Kiowa team leader in Queensland. "You're always thinking of better ways to do things, safer ways to do things." ■

eric.c.fetters-walp@boeing.com

PHOTOS: (Counterclockwise from top left) Near Taft, Calif., Boeing Test & Evaluation's John Engstrand, from left, Ernie Tamayo and Jeremy Bojorquez leave the dressing room in protective suits and carrying air bottles while escorted by Bill Pulliam; Bojorquez monitors the propellant tanks; Jeremy Strom helps Bojorquez safely don his protective suit; Pulliam inspects safety equipment to validate its certification. **BOB FERGUSON/BOEING** Mike Hurst, 767 team and safety lead in Everett, Wash., secures new LED safety lights by their suction cups to a cargo door on the 767 fuselage.

KYMBERLY VANDLAC/BOEING Brad Carthew re-torques the main rotor on a Bell 206B1 Kiowa helicopter while attached to the free-fall arrest unit, protecting him in the event of a fall; Boeing Defence Australia employee Nathan Brant's safety harness is clipped into the free-fall arrest unit prior to working on a Bell 206B1 Kiowa helicopter; the single-point anchorage free-fall arrest unit developed by the Boeing Defence Australia team in Oakey, Queensland. **HEIDI SNOWDON/BOEING**

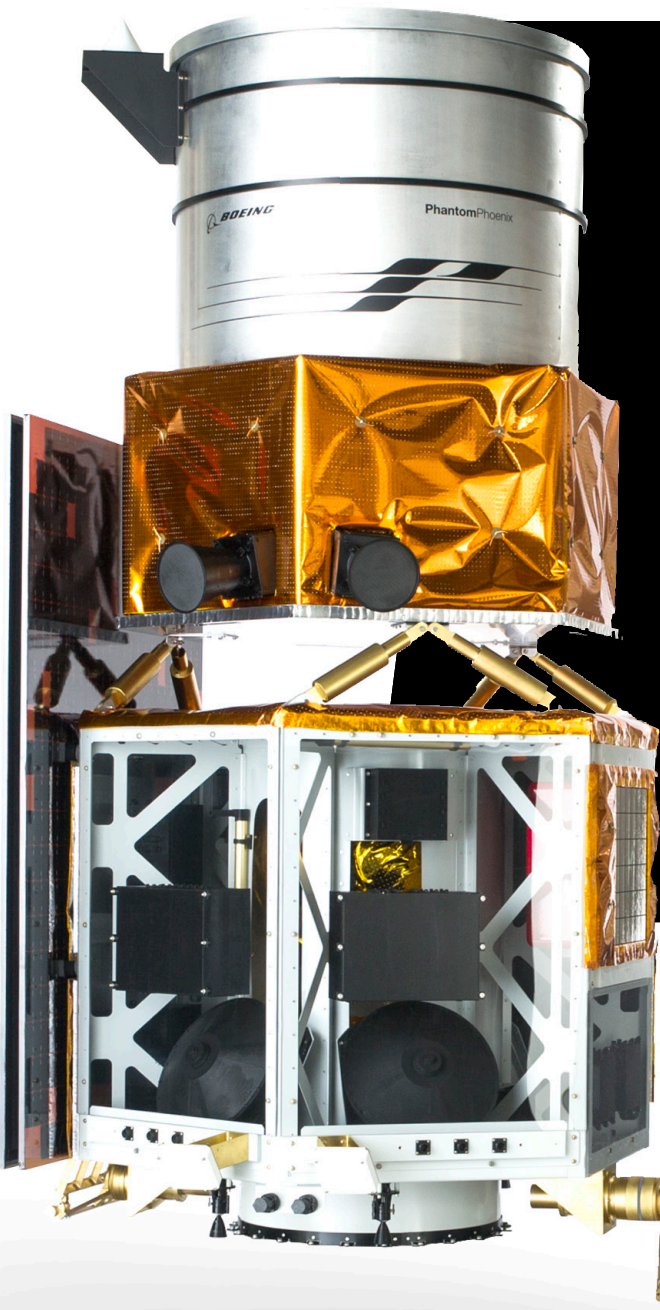
 **BOEING**
波音





飞越时代的伙伴

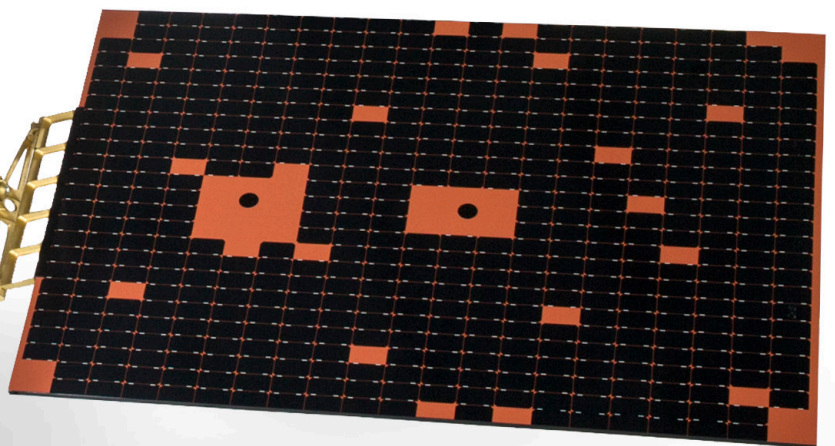
人们的出行方式随着时代发展的脚步，越变越快。40年来，波音有幸成为中国航空业志同道合的伙伴，共同打造更优秀的机型和飞行服务，将一代又一代中国人带向更远、更广阔的世界。这份坚持将伴随我们飞越时代的伙伴关系，带着不变的承诺，飞向未来。



Phoenix rising

Phantom Works team targets market 'sweet spot' with small and affordable satellite prototypes

By Eric Carlson



TALE OF THE TAPE: The Phantom Phoenix prototypes have three configurations.

Phantom Phoenix

9 feet 7 inches high (2.92 meters) by 9 feet 5 inches (2.87 meters) wide with solar array deployed; diameter is 4 feet (1.22 meters)

1,100- to 2,200-pound (500- to 1,000-kilogram) midclass, designed for single and dual launch

Phantom Phoenix ESPA

396-pound (180-kilogram) ESPA-class, attaches to a common interstage adapter allowing for the launch of more than one satellite at a time; up to six small satellites could be deployed during a single mission, reducing launch costs

Phantom Phoenix Nano

8.8- to 22-pound (4- to 10-kilogram) nanosatellite, offers affordable technology for science and weather missions



Before leaving home every morning for work at the Boeing site in Seal Beach, Calif., the one thing Bryan Welsch makes sure he has is his Boeing badge, which must be faithfully worn by all employees inside the company's buildings and is required to log on to the Boeing network. So when he arrived at work for a Monday morning strategy meeting back in the summer of 2010 and was told to replace his Boeing badge with a mock Phoenix Space Systems badge, he knew something was up.

"We were told to pretend we were in a completely different company because we were starting something completely new," recalled Welsch, a product line architect with Boeing Phantom Works. "We had folks representing engineering, assembly integration and testing, new business development, market assessment—all coming together to address a problem."

The problem? Boeing didn't have an offering for a growing segment of the market: smaller, more affordable satellites.

The Phantom Works team met the challenge head on and rapidly prototyped

two lines of satellites in three short years. The all-electric propulsion 702SP (small platform) was launched in 2012 and the Phantom Phoenix line of satellite prototypes was formally announced in April 2013—a significant feat in such a short time.

"Budgets increasingly demand that customers look for satellites that are affordable, can perform a wider variety of missions, and can be brought to market quicker," explained Erik Daehler, Phantom Phoenix program manager. "We had to think like a small, nimble company to figure out how to enter this market quickly and more affordably—we needed to be there."

The Phantom Phoenix prototypes range in size from a side-by-side refrigerator to a loaf of bread and are designed to be easily configured for mission flexibility. Potential missions range from intelligence, surveillance and reconnaissance to planetary science and weather observation. The prototypes share a common architecture, flight software and simplified payload integration, and are designed for all major launch vehicles.

"There is a hunger for smaller, simpler,

"There is a hunger for smaller, simpler, faster, affordable and more agile satellites—that's why we're after this share of the market."

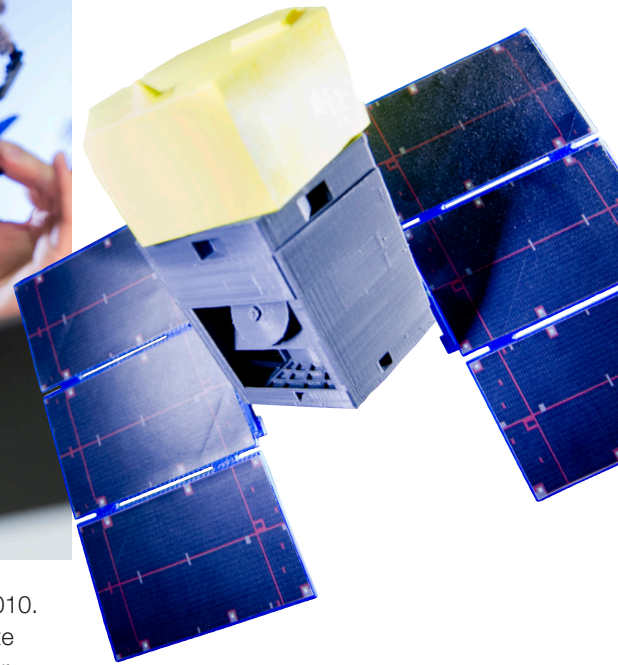
— Alex Lopez, vice president for Advanced Network & Space Systems

PHOTO: (Far left) Shown is a model of the Phantom Phoenix satellite prototype, the largest in the Phantom Phoenix family.

PAUL PINNER/BOEING

PHOTO ILLUSTRATION: (Above) With solar array deployed, a Phantom Phoenix orbits Earth in this artist's concept.

BRANDON LUONG/BOEING; SATELLITE GRAPHIC: BOEING; EARTH PHOTO: SHUTTERSTOCK



faster, affordable and more agile satellites—that’s why we’re after this share of the market,” said Alex Lopez, vice president for Advanced Network & Space Systems.

The Phantom Works team in Seal Beach that developed the prototype satellites averaged between 30 and 40 employees. While the team succeeded by approaching the challenge with the mindset of a smaller organization, they had the resources of the world’s largest aerospace company behind them.

“As an organization,” Daehler said, “Boeing has the collective experience, knowledge and buying power that smaller companies just don’t have. That’s what sets us apart from the competition.”

Welsch recalled the freedom the team

experienced from that first meeting in 2010.

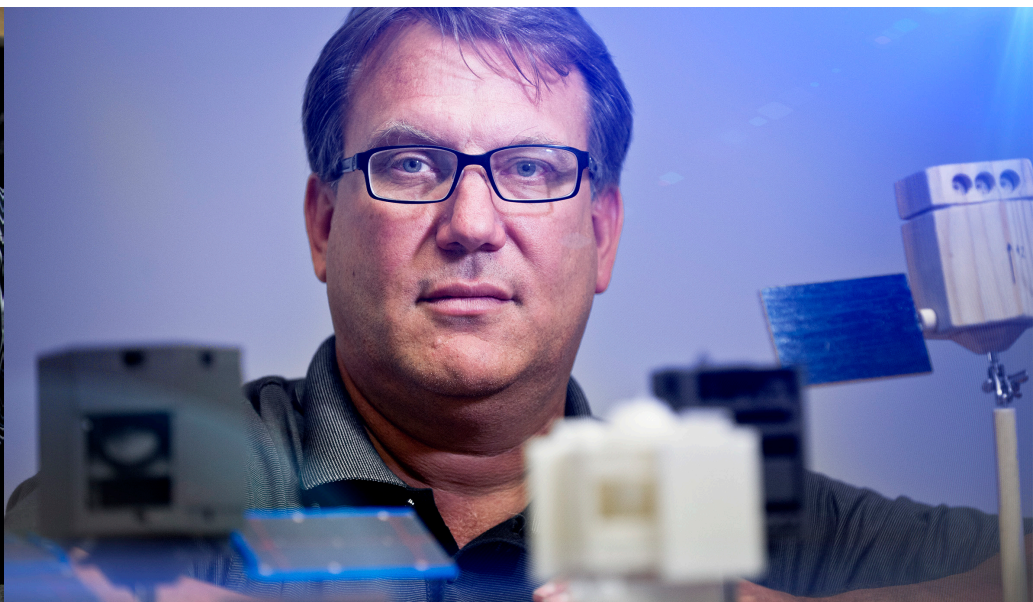
“Being able to start with a clean state is not something you often get the opportunity to do,” he said. “With Phantom Phoenix, we were able to step back from ‘Well, we’ve always done it this way’ and instead say, ‘What is the right way to do this?’”

Nick Musser, a guidance, navigation and control engineer, said the philosophy instilled in the team encouraged a unique approach to product development.

“You can describe it as a startup within Boeing,” Musser said. “It’s fast-paced, and by definition, no one has done what you’ve done. It offers learning opportunities and some problems that are difficult to solve. As engineers, that’s what we love to do.

“We used innovative business models, design and manufacturing methods. Combined, all these elements totally changed our method of satellite development and greatly reduced our development costs.”

— Erik Daehler, Phantom Phoenix program manager





The opportunity to solve a new, interesting, commercially relevant problem and build something—that’s why I like working here.”

Creating that “startup” culture was no accident and was established early by program leadership to encourage risk-taking and innovation—two ingredients necessary for rapid prototyping, according to Daehler.

“We knew that for us to design and prototype with speed, we needed to instill a new mentality in people working on the program,” Daehler explained. “We changed the work environment, breaking down cubicle walls, establishing collaboration zones, and brought in leaders from across the enterprise with experience in rapid prototyping. It wasn’t just a couple of physical changes—we used innovative business models, design and manufacturing methods. Combined, all these elements totally changed our method of satellite development and greatly reduced our development costs.”

One of the keys to making Phantom Phoenix affordable, Daehler and others on the program explained, is the common avionics and software package, which is compatible with a variety of off-the-shelf hardware components in any number of configurations.

Boeing has provided satellites to customers around the globe for more than 50 years. The Phantom Phoenix development team tapped into that vast experience.

The diversity of experience was especially valuable to Alex Stavros, a systems engineer on the program.

“When I first came on as an intern I got to work with someone who had worked on the Apollo missions,” Stavros said. “It was amazing to have access to someone with that depth of knowledge.”

Having been developed by Phantom Works, Phantom Phoenix will transfer to Space & Intelligence Systems, a division of Boeing Network & Space Systems, for commercial production.

Phantom Works President Darryl Davis said the Phantom Phoenix team has helped deliver on the promise of Phantom Works: creating the future.

That’s the role Phantom Works plays for Boeing Defense, Space & Security, Davis said, adding: “Partnering with Boeing Research & Technology, we design and prototype the next generation of Boeing products based on current and future customer needs. Once we’ve validated that technology, production transfers to our business partners, in this case Network & Space Systems.”

This approach demands agility.

“Being a smaller, more flexible organization affords us more opportunities to take some risk and innovate,” Davis added. “We’re able to quickly move our people to lend expertise and provide guidance. “The people—not just the products—are what make Phantom Works an exciting place.”

Tricia Hevers, a systems engineer on the program, is a recent college graduate who got to experience this philosophy in action.

“Being part of a smaller team allowed

me to be involved in a lot of different roles,” she said. “And because the team was small, each of us could see firsthand how our individual work impacted the entire project.”

The opportunity to create a new product doesn’t happen every day, Hevers noted. “I’m really excited—to work on a new generation of satellites.” ■

eric.j.carlson2@boeing.com

PHOTOS: (Opposite page, clockwise from top left) Engineers Nick Musser, left, and Alex Stavros inspect a satellite model; a model of Phantom Phoenix; engineer Tim Cook with satellite models; software engineers Aaron Steinfeld, left, and Derek Dreier collaborate. (This page) Removing cubicle walls increases collaboration for the Phantom Phoenix team: Musser, from left, Tricia Hevers, Erik Daehler, Stavros and Bryan Welsch. PAUL PINNER/BOEING

'A BETTER BOEING, A BETTER PLANET'



Boeing has significantly reduced its environmental footprint, even as business has grown

By Patrick Summers

As Annie Berry sat at her computer, busy with the many tasks she had to handle, she noticed that the air around her desk at the Douglas Center office complex in Long Beach, Calif., seemed chilly.

But Berry, a staff analyst with Shared Services Group's Site Services team, didn't have to pick up the phone and notify someone in Facilities. Instead, she simply called up a Web page that lets her check if the temperature around her workspace is in the target range. The temperature was below the set target, so with a few mouse clicks and keystrokes she sent a quick note to Facilities. Within minutes, the ventilation system eased up on the amount of chilled air sent to the area around Berry's desk.

If Berry or other Douglas Center employees need to work after-hours, when lighting and the ventilation systems are shut off, they can use the same website to turn on the systems themselves.

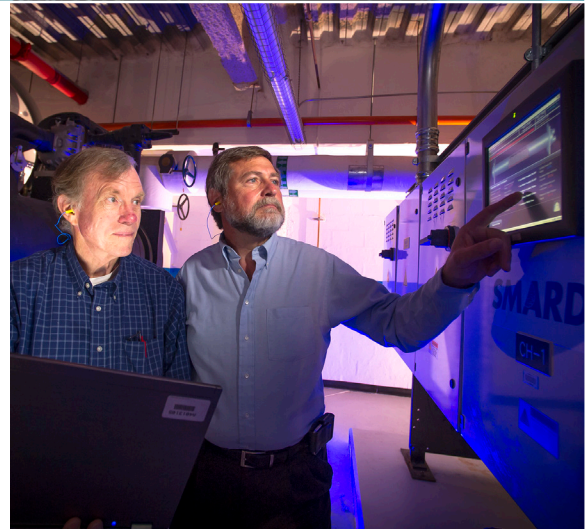
The ability to give Douglas Center employees visibility over their work environment lets employees make their workspaces more comfortable—and has helped the Long Beach site significantly reduce its energy use. Over the past five

years, the Douglas Center cut its electricity use in half, natural gas by 76 percent and water intake by 25 percent.

"Employees tell me how much they appreciate what we're doing," said Jeff Haberman, a Facilities engineer at the Douglas Center. "They like what the company is doing for the environment."

Ideas such as these have helped Boeing reduce the environmental impact of its factories and offices—even as the company experienced strong growth. In 2007, Boeing set five-year targets for reducing the environmental footprint of its operations. At the end of this

PHOTOS: (This page, from top) At the Douglas Center office complex in Long Beach, Calif., Judie King touches a computer screen to check the temperature in her work area; Steve Ashford, left, and Jeff Haberman monitor a new, energy-efficient water chiller; Annie Berry and Larry Keene access a website that displays office environmental data such as temperature. **BOB FERGUSON/BOEING** (Opposite page, from top) At Boeing South Carolina, Mandy Barron, from left, Rodney Wells and Kelsey Jennings use an environmentally responsible cleaning solvent. **ALAN MARTS/BOEING** Ryan Tomita adjusts an energy-efficient parking garage light in Everett, Wash. **COLLEEN PFEILSCHEIFTER/BOEING**





BIG IDEAS FOR A SMALLER FOOTPRINT

Over the past five years, Boeing has reduced its environmental footprint as a result of numerous ideas undertaken by employees at sites across the company:

- The Boeing South Carolina 787 factory switched to a more environmentally responsible cleaning solvent in its paint building, helping the site cut in half the amount of liquid hazardous waste generated in the paint process.
- At Boeing's largest manufacturing site in Everett, Wash., electricity conservation projects over the past five years have saved nearly 33 million kilowatt-hours of energy, enough to power 2,875 homes for one year. Thanks to alternative commuting programs, employees in Everett have eliminated 500 million commuter miles over the past five years.
- The Spares Distribution Center near Seattle dramatically boosted recycling and reduced solid waste. The percentage of solid waste recycled has jumped from 77 percent in 2009 to 93 percent in 2011, and the amount of trash sent to landfills has been cut by more than 70 percent since 2009.
- The new chemical processing facility at Boeing's Portland, Ore., site was built to Leadership in Energy and Environmental Design (LEED) Gold level standards, which means that construction used strategies to save energy, reduce greenhouse gas emissions, use water efficiently, and increase the use of recycled materials and recycling.
- Five Boeing manufacturing sites send no solid waste to landfills: Boeing Salt Lake; Long Beach, Calif.; Boeing South Carolina; Huntsville, Ala.; and Ridley Township, Pa.

More information about Boeing's environmental performance is available in the 2013 Environment Report, at boeing.com/environment.



“This strong environmental performance stems directly from the ingenuity and engagement of our entire Boeing team.”

– Kim Smith, vice president of Environment, Health and Safety

period, the company had met its goals of reducing energy and water use and carbon dioxide emissions, and generating less solid and hazardous waste.

During the same period, Boeing's overall business grew substantially: Total deliveries increased by more than 50 percent; the company opened a major new manufacturing facility in South Carolina; 13,000 new jobs were created across the company.

“This strong environmental performance stems directly from the ingenuity and engagement of our entire Boeing team,” said Kim Smith, vice president of Environment, Health and Safety. “This involvement will help us achieve continued improvements over the next five years.”

Boeing is committed to zero-carbon growth by 2017 while continuing to ramp up production, Smith said. The company aims to reduce its environmental footprint, from design and manufacture through in-service use and end-of-service recycling and disposal. Through this strategy, called Design for Environment, engineers “design in” greater energy efficiency and sustainable materials and “design out” carbon emissions, hazardous materials

and community noise.

“Boeing is committed to responsible environmental leadership. We are building a better Boeing and helping build a better planet,” Smith said.

The improvements in Boeing's environmental performance are the result of innovative projects, often led by employee teams, at facilities across the company.

For example, the St. Louis site, where Boeing makes the F-15 and F/A-18 jet fighters, has cut its water use by 20 percent over the past five years, thanks in part to a water-conservation plan devised by employees. The plan substantially increases the amount of water reused on-site instead of being discharged into the local storm sewers.

“It's gratifying to put a conservation plan in place and be able to see the improvements,” said Gary Buford, an environmental engineer at that facility.

And near Philadelphia, the renovation of the Chinook helicopter assembly factory includes windows and skylights that let in natural light and reduce energy use. Two new boilers have cut the site's carbon dioxide emissions by an estimated 14 percent and energy bills by \$1 million a year.

“The plant is beautiful; it's more comfortable and enjoyable to come to work,” said aircraft technician Deneen Beck. “And with the windows now we can see the flight line and the products we're making in the air. That really adds to the pride.” ■

patrick.a.summers@boeing.com

PHOTOS: (Opposite page, clockwise from top left) Environmentally engaged employees at Seattle's Spares Distribution Center help the facility cut waste and boost recycling. Clockwise from top left are Desmond Chanez, Joe Schoepfer, Dae Groseclose, Dave Mulhall and Sandy Holtman. **BOB FERGUSON/BOEING** Gary Buford tests water quality in St. Louis. **RON BOOKOUT/BOEING** Blake Izatt, left, and Crystal Jacobson help collect solid waste at Boeing Salt Lake, one of five sites that send zero waste to landfills. (This page) Deneen Beck, background, and Kim Lehman look out at the flight line through large windows that use daylight to help reduce energy use at the renovated Chinook helicopter assembly building near Philadelphia. **FRED TROILO/BOEING**

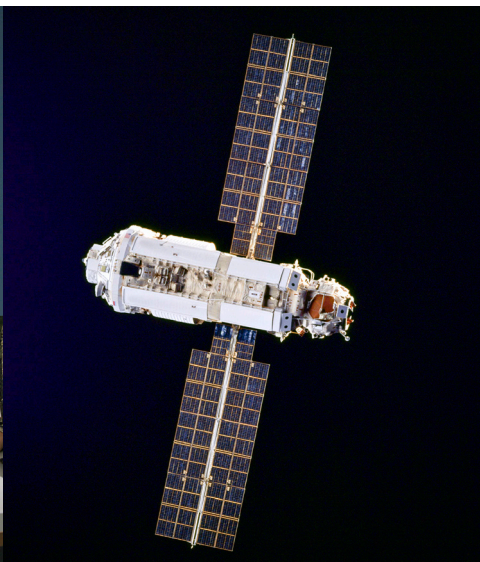


Leading across borders

Boeing, Russia partnership is flying high with expanded business opportunities

By Bill Sell





It typically takes about 11 hours to fly nonstop between Seattle and Moscow, but for some Boeing engineers the distance is often covered in the blink of an eye at the end of their workday.

The Boeing Design Center in Moscow works in concert with Boeing engineers in Everett, Wash., to provide around-the-clock design support for Boeing commercial airplane programs, and the arrangement has been particularly important for the 787 program.

Everett engineers can begin a work package and transfer it to Moscow at the end of their workday. The Moscow engineers then continue the project and, if additional work is needed, transfer it back to Everett before going home.

"This is a great example of Boeing's long-standing strategy to operate globally on a 24/7 basis," said Shep Hill, president, Boeing International, and senior vice president, Business Development and Strategy. "When Everett wraps up work for the day, Moscow picks up the ball and takes it to the next level. It's successful because they've worked through cultural and language differences, shared best practices and integrated their IT networks."

It also underscores the importance of a relationship between Boeing and Russia that formally began 20 years ago next month, with the 1993 opening of the Boeing Technical Research Center in Moscow to tap the talent of Russian scientists and information technology specialists to work on Boeing contracts in commercial aviation, information technology and space.

After the MAKS 2013 air show near

Moscow ends on Sept. 1, this anniversary will be celebrated with a special stakeholder event attended by some of Boeing's senior executives.

But the ties between Boeing and Russia go back even further. It was the exploration of a new frontier—space—that brought Boeing and what was then the Soviet Union together long before the research center opened in Moscow.

In July 1975, a U.S. Apollo command module built by Boeing heritage company North American Aviation docked with a Soviet Soyuz spacecraft. Boeing's relationship with Russia went on years later to include collaboration on the International Space Station.

Today, Boeing's partnership with Russia is more Earth-bound. Boeing Commercial Airplanes has found Russia to be an excellent source of engineering expertise, and an important supplier of titanium and titanium parts.

"We have a wonderful relationship that is based on mutual trust and a mutual commitment to technical excellence," Hill said. "Our collaboration in technical, engineering and industrial programs has played an important role in improving the productivity and performance of The Boeing Company and has also directly and beneficially supported our competitive differentiation leading to several important commercial airplane orders in recent years."

In 2011, Aeroflot Russian Airlines, the nation's flag carrier, ordered 16 Boeing 777-300ER (Extended Range) jetliners. Four have been delivered, making it the first airline in Russia to operate the model.

Aeroflot previously placed an order for 22 787-8 Dreamliners.

Transaero, the first private airline in Russia, has ordered four 787-8 Dreamliners. In April of this year, Sberbank Leasing announced an order for 12 Next-Generation 737-800s, which will be leased to Transaero.

UTair Aviation of Russia finalized an order in 2011 for 40 Next-Generation 737s. (See Page 14.) Aviation Capital Services, a subsidiary leasing company of the State Corporation of Russian Technologies (Rostech), announced a commitment to purchase 35 737 MAX airplanes.

In addition, Boeing has delivered three of the five 747-8 Freighters ordered by the Volga-Dnepr Group.

Boeing is working with Russian interests to expand financing and leasing opportunities for Boeing airplanes there and in the Commonwealth of Independent States.

As a result of a partnership begun in 2011 between Boeing Capital and Sberbank,

PHOTOS AND ILLUSTRATION: (From far left) Symbolizing Russia's development and role in the world economy, the Moscow International Business Center, or "Moscow City," will combine business, living space and entertainment in one location. SHUTTERSTOCK The Boeing Design Center team in Moscow includes Ekaterina Altunina, from left, Anna Synkova (standing), Dmitry Rubtsov, Nikolay Erokhov and Julia Varkalova. MIKHAIL MELNIKOV Boeing and Russia are upgrading the Functional Cargo Block, shown after its launch in 1998. The first major component of the International Space Station, it provided the station's initial power and propulsion. NASA An artist's concept of a Boeing 777-300ER (Extended Range) in Aeroflot Russian Airlines livery. BOEING



Russia's oldest commercial bank, the bank's leasing unit placed the billion-dollar order for new Next-Generation 737s in April.

In recent years, Boeing has expanded its relationship with Russia in several ways, according to Sergey Kravchenko, who joined Boeing in 1992 and has served as president of Boeing Russia and the Commonwealth of Independent States since 2002.

One of the most significant is its strategic alliance with Rostech and its partnership in Ural Boeing Manufacturing in a remote area of the Ural Mountains near the Russian town of Verkhnyaya Salda. The facility, which employs 100 people, machines 16 unique parts for Boeing commercial airplanes that are made, in part, from a specially developed titanium alloy. Valuable titanium chips produced during manufacturing are sent to a VSMPO-AVISMA titanium mill on the same site.

VSMPO-AVISMA is a critical titanium supplier for Boeing Commercial Airplanes, Kravchenko noted, adding: "They are also an important ally in developing technical and business solutions to keep Boeing jetliners competitive in the marketplace."

Ural Boeing Manufacturing, established in 2007, now manufactures several titanium parts for the 787 Dreamliner. The side-of-body lower chord, for example, is one of the most complex and critical joints on the airplane. The facility also produces Boeing Next-Generation 737 main landing gear beams.

Boeing is also working with several Russian organizations to increase the efficiency and capacity of major Russian

airports. The Boeing Flight Services Air Traffic Management group and Boeing subsidiary Jeppesen are developing solutions to optimize the safety and efficiency of Russian airspace.

"The modernization of these air traffic management systems is especially important around Moscow, which has the heaviest air traffic in the country, as well as Sochi, the home town for the 2014 Winter Olympics," Kravchenko said.

Airlines in Russia and the Commonwealth of Independent States over the next 20 years are expected to take delivery of 1,170 new airplanes valued at \$140 billion, according to Boeing's *Current Market Outlook*. Twenty-three Russian airlines operate more than 300 Boeing aircraft, many through operating leases. Boeing has a market share of approximately 60 percent of the Western-built fleet in Russia, or 34 percent of the total fleet.

Marty Bentrrott, Commercial Airplanes' senior vice president for International Sales in the Middle East, Russia and Central Asia, said Russia's need to modernize its fleet has increased opportunities for new airplane sales, and Boeing products have been particularly successful in recent years. He said there has been a very positive reception to the capabilities of the Next-Generation 737, including its ability to perform in very cold climates. The 777-300ER has been a big success in Russia, and there is a backlog of orders for the 787 Dreamliner.

"We are very proud of our customer relationships in Russia," Bentrrott said.

That view is echoed by Boeing engineers and others who have a long

association with their Russian partners on space-related programs, including the International Space Station, for which Boeing is the prime contractor.

Boeing's Brad Cothran, vehicle director for the International Space Station, has spent 20 years on the program and has had extensive experience working with Russian partners. He is currently working with the Moscow-based facility, Khrunichev State Research and Production Space Center, to plan an upgrade to the space station's Functional Cargo Block module, which was the station's first module, launched in 1998.

"I have very much enjoyed working with the Russians," Cothran said. "They're straightforward, and you can tell that giving your word means a lot to them. Overall, it's been a fun cultural and professional experience." ■

william.j.seil@boeing.com

PHOTOS AND ILLUSTRATIONS: (Above, from left) Ural Boeing Manufacturing is next to VSMPO-AVISMA's titanium mill. VSMPO PRESS SERVICE Ekaterina Altunina, left, and Nikolay Erokhov at the Boeing Design Center, Moscow. MIKHAIL MELNIKOV An artist's concept of a Boeing 787-8 Dreamliner in Transaero livery; the airline has four on order. BOEING Sergey Kravchenko, president, Boeing Russia and the Commonwealth of Independent States, right, with Mike McFaul, U.S. ambassador to Russia, inspect the flight deck of a 787 Dreamliner when the airplane visited Moscow during the 2012 Dream Tour. MARIAN LOCKHART/BOEING An artist's concept of a Boeing Next-Generation 737 in UTair Aviation livery. The airline has 40 on order. BOEING (Right) Saint Basil's Cathedral in Moscow recalls Russia's rich culture. SHUTTERSTOCK





MIDSUMMER NIGHT'S DREAM

A night delivery ceremony made for a dramatic setting outside the Future of Flight Aviation Center near Boeing's Everett, Wash., site in late June. The occasion was the first 787 delivered to International Lease Finance Corporation and the first for its lessee, Norwegian, which has eight 787s on order through lease agreements and direct deliveries. It also marked the 700th Boeing airplane delivered to the Los Angeles-based leasing company since 1978. The Norwegian 787 livery includes an image on the tail of the late Sonja Henie, the Norwegian-born Olympic figure-skating champion and movie star. PHOTO: KATIE LOMAX/BOEING







FOR INDIA, A NEW ERA OF MARITIME SECURITY.

Boeing recently delivered to India the first P-8I long-range multi-mission maritime aircraft, on-schedule and on-budget. This new aircraft provides advanced capability to help safeguard the nation's waters and borders for decades to come. We're proud to salute the Indian Navy on this important milestone — a testament to our enduring partnership with India.

 **BOEING**