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Boeing Frontiers



MEET YOUR WORKSPACE

The 737 manufacturing facility in Renton, Wash., includes features of what the Boeing workplace of tomorrow might look like, as envisioned by the Future of Work project. Here's a glimpse at what your workspace could look like—and how it will enhance the productivity of you and Boeing.

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Boeing Frontiers

ON THE COVER: At the 737 manufacturing facility in Renton, Wash., are (clockwise from front left) Martin Kennedy, Steve Lin, Sam Feist and Diana Strong.

Photo by Jeff Corwin



MICHELLE LITVIN PHOTO, COURTESY OF NBBJ

COVER
STORY

NICE DIGS 12

The demographic makeup of the U.S. work force is shifting, thanks to various population trends. In preparation for these changes, the Future of Work project at Boeing is looking to provide a workspace that will support productivity among tomorrow's Boeing employees. The 737 manufacturing facility in Renton, Wash., (above) reflects aspects of what the team envisions for future work locations.

**LEND
A HAND**

28 After an aircraft system is delivered, government and military customers require an array of services to ensure people and equipment are prepared for the missions ahead. Support Systems, one of Integrated Defense Systems' business centers, provides integrated solutions to deliver cost-effective readiness.

**FEATURE
STORY**

COMMERCIAL AIRPLANES

Looking forward

18 A lot has happened in the two years since the formal launch of the Boeing 787 Dreamliner program. And there's much more coming in the next two years, including building the first several airplanes and starting the flight-test program.

Look ma, no hands!

19 The Rapid Prototype Manufacturing organization, part of the Commercial Airplanes Engineering and Manufacturing organization, uses processes known as "additive technology" or "e-manufacturing" to build objects in a new and striking way.

Big payload, big demand

20 With eight conversions scheduled for 2006, the 747-400 Boeing Converted Freighter program is ramping up to meet demand. That means there's lots of work to be done on these large airplanes. But program teammates are working together to tackle the needed tasks.



JIM ANDERSON PHOTO

19 George Robinson, a model maker and technician with the Rapid Prototype Manufacturing organization, reviews design data that will program an EOS M270 machine to build a part. The RPM lab, a part of the Commercial Airplanes Engineering and Manufacturing organization, uses technology to build parts in a new way.

INTEGRATED DEFENSE SYSTEMS

No business like new business

21 The Acquire Business Center is a one-stop shop that gives Integrated Defense Systems capture teams the support to pursue new business campaigns more efficiently and effectively. The 12 centers are designed so teams involved in campaigns have everything they need at their fingertips.

The right formula

24 Boeing has improved Space Shuttle tiles substantially by developing Boeing Rigid Insulation, which is five to 10 times stronger and more durable than any tile used before it. Here's a look at the team that worked painstakingly to come up with the material for the upgraded tiles.

Passing the test

26 In a recent virtual exercise, the individual components of Future Combat System operated together for the first time. This successful demonstration brings closer the day when U.S. forces will operate in an information-rich battle space where threats are identified more rapidly, understood more fully and targeted more precisely.

Fast information sharing

27 A commercial technology that's used to track packages is now giving U.S. Army pilots of AH-64D Apache Longbow helicopters enhanced communications abilities. The technology is helping Apache Longbow pilots display and report enemy locations, display and identify friendly positions, and stay connected.

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Let's take services productivity to the next level

James Bell

Executive vice president, Finance, The Boeing Company
Boeing companywide sponsor, Internal Services Productivity initiative
Chief financial officer, The Boeing Company

At Boeing's annual investor conference last month, the financial community responded positively to the company's excellent operational performance, record backlog, strong competitive position and prospects for future growth. And our stock is valued near an all-time high.

So if things are going so well, why are we putting so much emphasis on improving productivity and controlling costs?

Because the key to growing Boeing and remaining competitive in the future is continually finding ways to run the business better tomorrow than we did today—and even better the next day.

The Internal Services Productivity initiative, which I sponsor, is a companywide effort to significantly reduce indirect costs that are centrally managed or embedded in the business, while boosting functional productivity to enable growth opportunities and improve business performance. Boosting Boeing productivity strengthens our competitiveness, fuels growth and drives world-class financial performance. The initiative is a means by which we must operate the company.

Whether it's eliminating redundancy, improving efficiency or providing more timely service users really need, you can think about it as taking Lean into the office environment.

The opportunity for savings is big. Boeing's centrally administered costs, corporate and business unit functional support, Information Technology, shared services and nonproduction procurement consume a significant portion of annual revenues—and would continue to grow if unchecked.

Variability, complexity and lack of standardization add expense, hamper efficient business operations, jeopardize competitiveness and limit staff mobility. We must change to survive and thrive. If we can take redundancy out, get efficiency in and simplify our processes, we'll see significant savings.

While declining to cite specific targets, Boeing Chairman, President and CEO Jim McNerney has said he's looking for "nothing less than meaningful improvement" in Boeing productivity. And he's predicted the initiatives and business momentum can take Boeing financial performance beyond our current 7 percent net-margin target.

None of this is to suggest Boeing businesses haven't already been operating efficiently—they have. But now we're taking it to a whole new level and applying it in new ways. It's about changing the way we think about support functions and the way we operate the company—managing the "transactional cost" of supporting the business. To make sure we're capturing good work already begun, we're working to catalog projects across the enterprise in a central database where we can share best practices and spur new ideas.

We're already seeing success stories from all corners of the



RON BOOKOUT PHOTO

James Bell

Executive vice president, Finance, The Boeing Company
Chief financial officer, The Boeing Company

Boeing companywide sponsor,
Internal Services Productivity initiative

company. At Shared Services, reducing purchase options and leveraging Boeing's buying power for certain computer printer toner, for example, saved \$450,000 in one year. Partnering with the 787 Dreamliner team to manage logistics for certain parts and materials used in final assembly and delivery enabled SSG to cut costs by 65 percent for a 10-year savings of \$193 million.

At Commercial Airplanes, the Cost Management group is creating a standard operating procedure for forecasting labor rates in the Finance organization. Through this work, they think they can reduce cycle time from 12 days to four and whittle hand-offs from 40 to three.

We're even getting more productive in the way we tell our financial story to external stakeholders like the investors we met last month. This year, we changed the way we post our annual report on the World Wide Web and shaved more than 90 percent of the cost of that process.

Whether on the manufacturing line or behind a desk, every Boeing employee makes a difference in company productivity. With every decision we make—whether it's consolidating office supply purchases, value-stream-mapping major processes or challenging the way we have done things in the past to attack key cost drivers—we each have an opportunity every day to ask whether this can be done faster, more cost-effectively, with fewer touch points, less rework and with better quality from the customer's perspective.

Every dollar we free up through productivity improvements is a dollar we can put into growing the company and, ultimately, creating more opportunities for employees and our communities. Ultimately, the more productive we become, the more we will help the company grow—for everyone's benefit. ■

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LETTERS

A magazine for all?

I am concerned that despite all the efforts made throughout Boeing to encourage teamwork, *Boeing Frontiers* is falling into the same pattern that the old *Boeing News* exhibited.

Look at all the back issues of *Boeing Frontiers* and see who gets their picture published. It's always the directors and vice-presidents of whatever department is featured in a story—and seldom the workers who make things happen.

Take the April 2006 issue. I happen to know a couple of the VPs and directors pictured in it, from either having worked for them or with them. They're very competent managers at whatever they do, but those pictures! They are terrible for the content and the posturing. Neither of those folks would or indeed should be trying to pretend they know one iota about what's going on with the parts and paper they appear so avidly to be studying. So for goodness sake, keep them out of the pictures and let the workers have a fleeting moment of glory with whatever they have achieved.

—Bill Proud
Pulaski, Tenn.

Editor's note: *We at Boeing Frontiers aim to quote and show photos of employees from all levels.*

Kudos for Micky

I just read your article on Micky Axton (Page 7, May 2006). What a wonderful piece of writing, and what a unique lady. I had the opportunity to attend the opening of the Museum of Flight's Courage Wing in June 2004 in Seattle. A number of former Women Airforce Service Pilots were in attendance. I think I spent more time talking to them than I did

“Let the workers have a fleeting moment of glory with whatever they have achieved.”

—Bill Proud
Pulaski, Tenn.



weighed. He was large, at 9 pounds, 6 ounces. Since the 747 is Boeing's largest commercial plane and Keith was so big, many people have gotten a good laugh from this.

After telling the birth time and weight to one friend of mine, who happens to be a pilot, he remarked, “Man, he is a 747!”

—Josh Peterson
Everett, Wash.

Seeking Lunar Orbiter teammates

On Aug. 10, 1966, Boeing entered the Space Age with the launch of Lunar Orbiter I. On Aug. 23, Lunar Orbiter took the first photo of Earth from deep space. That spacecraft and four more that followed proceeded to photograph the moon in one of the most successful space programs ever launched.

To commemorate the 40th anniversary of that first mission, Lunar Orbiter Program veterans will hold a reunion at the Museum of Flight in Seattle on Aug. 22. Reservations will be required for attendance. We are trying to locate as many people as possible who worked on the program.

For further information and to make reservations, contact Pat Itzen by calling (253) 631-0113 or sending an e-mail to pat.itzen@juno.com.

—Pat Itzen
Kent, Wash.

to the World War II fighter aces. Courage is such a simple word to describe these women.

—Thomas Powell
Everett, Wash.

'747' at 7:47

I work in Everett, Wash., the home of the Boeing 747. My wife Shannon and I had our first child on Feb. 14, a son we named Keith. The weeks before his birth, we joked about that it would be funny if he were born at 7:37, 7:47, or 7:57. We did an at-home birth with a midwife. Since I was catching him when he was born, the last thing I was watching was the clock.

About 15 minutes after Keith was born, my mother-in-law said to me, “Well, you got your 747!” I couldn't believe it and said, “No way. He was really born at 7:47? That's too funny!”

Shortly after, Keith was

Letters guidelines

Boeing Frontiers provides its letters page for readers to state their opinions. The page is intended to encourage an exchange of ideas and information that stimulates dialogue on issues or events in the company or the aerospace industry.

The opinions may not necessarily reflect those of The Boeing Company. Letters must include name, organization and a telephone number for verification purposes. Letters may be edited for grammar, syntax and size.

SNAPSHOT

FORMIDABLE FORMATION A B-17G Flying Fortress and a B-52H Stratofortress fly in a heritage flight formation on May 13 during the 2006 Defenders of Liberty Airshow at Barksdale Air Force Base, La. These two aircraft represent 70 years of “fortresses.” It was one of the first times in 50 years they’ve flown in formation.

U.S. AIR FORCE PHOTO BY MASTER SGT. MICHAEL A. KAPLAN



QUOTABLE

In going forward, there will be no tradeoff between performance and values at Boeing. We expect our people to demonstrate both.”

—Boeing Chairman, President and CEO Jim McNerney, in his address during the May 1 annual shareholders meeting

The 787 is the most successful new launch of a plane—ever. But the burden is that their engineering is as good as they say it is.”

—Howard Rubel, an aerospace analyst at Jeffries & Company, in the May 7 *New York Times*

Continued production of the C-17 ensures America’s airlift needs will continue to be met in the global war on terror and humanitarian relief missions.”

—California Gov. Arnold Schwarzenegger, in a letter urging Congress to continue funding for the C-17 military airlift program. Boeing builds the C-17 in Long Beach, Calif.

IAM PROMOTIONS

No promotions listed for periods ending April 28, May 12 and May 19. The period ending May 5 included the following promotion: Orgn: GG-GG-PCEM; PLOC: Renton, Wash.; Job no.: 41908, Shift: 2; Sen. date: 05/04/89; Clr. date: 05/02/06

ETHICS QUESTIONS?

You can reach the Office of Ethics & Business Conduct at 1-888-970-7171; Mail Code: 14-14; Fax: 1-888-970-5330; TDD/TTY: 1-800-617-3384; e-mail: ethicsLine.ethics@boeing.com; Web site: <http://ethics.whq.boeing.com>



BOEING ARCHIVES PHOTO

DUELING BOMBERS

Boeing's YB-52 beat out Convair's YB-60—and continues to serve

By ERIK SIMONSEN

With an unmistakable drone produced by its six pusher-mounted piston engines (and four J57 jet engines), the massive Convair B-36 Peacemaker was the mainstay of the United States' long-range bomber force during the late 1940s and early 1950s. But the Peacemaker's days were numbered as U.S. adversaries modernized their air-defense systems. As early as 1946, the Air Force recognized the need to eventually develop a fast intercontinental-range bomber. Initially, planners thought turboprops offered the best solution, which would sacrifice speed for range.

Although there was never an official Air Force fly-off, Boeing and Convair went head-to-head demonstrating bomber prototypes (a Douglas turboprop-powered proposal never moved off the drawing boards).

With the B-36 production line in place at its facility in Fort Worth, Texas, Convair felt it had a lower-cost solution. A transition production plan called for a jet-powered (YB-36G) variant to follow the B-36F, if a new Air Force contract could be secured. The new aircraft would have 72 percent parts commonality with the B-36.

Convair submitted an unsolicited proposal on Aug. 25, 1950. On March 15, 1951, the Air Force authorized a contract to convert two partially completed B-36s to a jet-powered configuration. The No. 1 aircraft received an Air Force designation of YB-60, and the No. 2 with production features would be the B-60.

With its B-47 medium-range jet bomber operating with Strategic Air Command,

The sleek YB-52 showing the two-seat tandem cockpit arrangement. The XB-52 was the second example to fly and also participated in the B-52 flight-test program. The B-52 continues in service today in the U.S. Air Force's heavy bomber fleet.

Boeing decided to compete and assembled a top design team. Boeing designers Well Beall, George Schairer and Ed Wells formed the core of the Boeing team. The original design (Model 462) looked like an uprated six-engine B-29, which by October 1948 evolved into a swept-wing turboprop configuration (Model 464-35), similar to the Russian Tu-95 "Bear."

After meetings with Air Force officials, the Boeing offering evolved into a jet-powered design with a 20-degree wing sweep and predicted top speed of 500 mph. Advised to give the design more speed, the Boeing team—which added Bob Withington, Vaughn Blumenthal, Art Carlsen and Maynard Pen-

U.S. AIR FORCE PHOTO



Convair put forth its YB-60 as a candidate to be the U.S. Air Force's fast intercontinental-range bomber. Among its selling points: Strong parts commonality with Convair's B-36 bomber, which was in service with the Air Force.

substantially increased drag. Additionally, high aerodynamic forces on a flight control system originally designed for slower airspeeds degraded performance considerably.

After its initial ferry flight to the Edwards Air Force Base Flight Test Center in California, the YB-60 flew 25 sorties and accumulated approximately 83 hours of test flight time. The second aircraft (B-60) was to be closer to a production con-

nell—came up with the right solution: a 35-degree sweep and eight Pratt & Whitney J57 jet engines. During the final meeting, the team presented its 33-page report, along with a hastily produced balsawood model (which today resides in the Boeing archives). The design was ultimately accepted by the Air Force, and Boeing was authorized to build two aircraft, the XB-52 and YB-52. Estimated top speed was more than 600 mph with a range far greater than that of the B-47's.

On the surface, it seemed like a close race. The YB-52 made its first flight on April 15, 1952, and just three days later at Convair's Fort Worth facility the YB-60 was airborne. Most notable on the YB-52/XB-52

was the tandem seat cockpit. The B-52A and subsequent variants featured a conventional flight deck with side-by-side seating.

Initial reports on the YB-52 were extremely promising, substantiating the design's jet-powered flight dynamics, which included spoilers acting as ailerons. This strategy proved its worth, as the aircraft's performance ultimately secured the win for Boeing. At Convair, modifying the B-36 airframe and achieving the desired performance was not as simple as first imagined. The wing was swept at 37 degrees and the thickness of the wing chord, inherited from the B-36, allowed for 10 fuel tanks holding 42,106 gallons of fuel—but at a cost of

figuration and featured a more aerodynamic nose that, if it had flown, would have increased airspeed. However, the Air Force ordered the B-52 into production in December 1952 and announced cancellation of the B-60 program the following January. The YB-60 and the 95-percent-completed B-60 were both scrapped.

Each subsequent model of the B-52 resulted in dramatic improvements to the bomber's structure and internal systems. Ready to operate in a network-enabled environment, the current B-52H continues to serve the Air Force today—and will for decades to come. ■

erik.simonsen@boeing.com

TALE OF THE TAPE	YB-52	YB-60
Made By	Boeing	Convair
Span	185 feet	206.4 feet
Wing Area	4,000 square feet	5,239 square feet
Length	157.07 feet	171.2 feet
Height	48.4 feet	60.6 feet
Empty weight	160,000 pounds	150,000 pounds (estimated)
Gross takeoff weight	390,000 pounds	410,000 pounds
Top speed	600 mph	508 mph
Cruise speed	525 mph	467 mph
Service ceiling	50,000 feet	44,650 feet
Range	8,000+ miles	8,000 miles
Engine	Pratt & Whitney YJ57-P-3 turbojets, 8,700 lb. thrust each	Pratt & Whitney YJ57-P-3 turbojets, 8,700 lb. thrust each

DAWN M. PETTIT PHOTO



An experience that ‘gave me my life back’

How the Health Risk Assessment, follow-up counseling helped employee get on track

David Shoemaker knew he needed to make a change.

An automobile accident in December 2003 had made pain a constant part of his life. The aches and soreness continued week after week, and he became less agile and increasingly lethargic. “I would drive to the mailbox: That’s how bad it was,” said Shoemaker, a technician at Boeing’s Heath, Ohio, facility.

In the spring of 2005, something happened that caused Shoemaker to see his life in a new light. The spark came from an unexpected source: an e-mail from Boeing Wellness encouraging employees to take the Mayo Clinic Health Risk Assessment.

Offered each spring to Boeing employees, their spouses and domestic partners, the HRA is a confidential online questionnaire designed to help participants measure a variety of factors that determine their overall

health. People whose results show that they could benefit from weight or stress management, added physical activity or better nutrition can request six months of free health coaching from professional Mayo Clinic Advisor counselors.

Shoemaker completed the assessment, and the results confirmed what he already felt: The quality of his life was deteriorating. In a little over a year, he had gained more than 40 pounds. He wasn’t eating healthy foods. He dreaded exercise. And to combat pain, arthritis and other ailments, he was taking up to nine pills a day.

When he took the online survey, Shoemaker checked the box to indicate he was willing to be contacted by a Mayo Clinic Advisor counselor. He admitted that at first he was reluctant to ask for help. “But the clothes were getting bigger and I was getting slower,” Shoemaker said. “It wasn’t easy to commit, but I decided I wanted to do it.”

Shoemaker was pleasantly surprised by the tone of his initial conversation with the Mayo Clinic counselor. “She was so professional,” he recalled. “Her attitude was, ‘We’re here to help, and we’re here to listen to you and assist you.’ I thought, ‘Wow, I should have done this a long time ago.’”

David Shoemaker credits the Mayo Clinic Health Risk Assessment and follow-up counseling for helping him improve his general state of health. Boeing employees and their spouses who take the online assessment by June 30 are eligible for a \$25 gift card redeemable at merchants nationwide.

Shoemaker read the “substantial” packet of information he received in the mail and began making changes in his life: eating a more balanced diet, drinking water instead of soda, and gradually taking longer walks.

Just as importantly, he looked forward to the monthly calls from his counselor. “The anticipation of knowing I was going to get a phone call from this person and that they were going to talk positive to me” meant a lot, Shoemaker said. “I always left the conversation with a feeling that somebody cares about me.”

Today, Shoemaker is 40 pounds lighter, three belt sizes thinner and pleased to report he once again fits comfortably behind the steering wheel of his prized 1932 Ford. Although he still feels some pain, he’s cut back on many of the medications, walks regularly, and has returned to activities he enjoys, including pampering his classic cars and taking part in a club that reenacts Civil War battles.

“In the last year, it’s just amazing what I’ve done and accomplished,” he said.

Shoemaker is now looking forward to an active life when he retires. He said he owes a debt of gratitude to the Mayo Clinic Advisor program for helping him stay on the path to good health.

“The things I was looking forward to as I got closer to retirement were slipping away. Now, the reality is they’re still attainable,” he said. “I feel like [the experience] gave me my life back. It’s given me the quality of life that I was planning on having.” ■

Take the HRA and brighten your day with a \$25 gift card

Employees who take the Mayo Clinic Health Risk Assessment on www.BoeingWellness.com before June 30, 2006, will receive a \$25 gift card redeemable at more than 350 merchants nationwide. Spouses or same-gender domestic partners also are eligible if they are enrolled in a Boeing medical plan.

People whose results show that their well-being would get a boost from weight or stress management, added physical activity or better nutrition can request six months of free health coaching from professional Mayo Clinic Advisor counselors.

Spreading the word

Initiative actions, education accelerate

Activity to promote and support Boeing's four companywide growth and productivity initiatives continued last month. Here's a look at some of the many initiatives-related achievements and discussions across Boeing.

- Shared Services Supplier Management reached another milestone in its ongoing effort to simplify ordering office supplies and other nonproduction items. Last month, the team slimmed down the list of item options in 25 categories. That's on top of the reduced variation already achieved in 18 other categories.

This Supplier Management project, first announced in March, is aimed at reducing Boeing's variety of office materials and other nonproduction items. This endeavor supports the **Internal Services Productivity** and **Global Sourcing** initiatives by saving money and employees' time while ensuring consistently high-quality products.

Before this effort started, there were 47 types of rubber bands; 92 types of paper clips, clamps, tacks and fasteners; and 86 types of shears, knives and letter openers.

During the first phase of the project in March, the team tackled 18 categories of supplies and cut 225 items, a 32 percent reduction. The estimated annual savings to the company is \$470,000, or 20 percent of the \$2.3 million spent last year for those items alone. The May reductions will trim the list of options in 25 more categories from 10 to 20 percent. Reductions will continue through 2006 in four more phases, resulting in significant reductions in nearly 10,000 categories of products.

- The message from Integrated Defense Systems leaders speaking at last month's Supplier Quality Summit III was clear: We're making progress, but opportunities to improve still exist.

"Success in our efforts depends on us working together with our suppliers, maintaining open and honest communication, putting the right processes in place, and operating with a shared set of values," said IDS President and CEO Jim Albaugh, who's also the companywide sponsor of the **Global Sourcing** initiative.



Testing for the future

Teammates pause during recent wind-tunnel tests on a prototype of the Blended Wing Body (BWB) concept. The tests took place at NASA's Langley Research Center in Hampton, Va. In cooperation with NASA and the U.S. Air Force Research Laboratory, the Phantom Works organization of Boeing is exploring and validating the structural, aerodynamic and operational advantages of the BWB, a futuristic aircraft design. Two high-fidelity, 21-foot-wingspan prototypes of the BWB concept have been created for wind-tunnel and flight testing. The Air Force has designated the vehicles as the X-48B, based on its interest in the design's potential as a flexible, long-range, high-capacity military aircraft.

The event, which supports Global Sourcing, was hosted by IDS Vice President of Supplier Quality Larry Myers and featured an expanded role for suppliers. Representatives from Honeywell and EFW made presentations at the summit, detailing their relationship with IDS.

The goal of the Supplier Quality Summits is to examine current issues and facilitate more effective management of the IDS supply base. Supplier Quality Summit IV is tentatively scheduled for this fall.

- The leader of the **Lean+** initiative encouraged attendees at a companywide Lean conference to continue their efforts to discover, implement and share ways to increase efficiency.

"We know that we've had tremendous Lean successes across the company. So, although the term Lean+ is new, there's tremendous momentum in the things that we

have accomplished," said Lean+ initiative leader Bill Schnettgoecke, in his keynote address at the 10th annual Boeing Lean Enterprise conference in late April. "Let's springboard off of those strengths to achieve new levels of performance."

Referring to the conference's theme of "Leaders Leading Change," Schnettgoecke added, "Whatever level you're at in the company, you all are leaders. And it's up to us, as leaders, to set the tone."

The conference, which took place in Costa Mesa, Calif., featured Boeing leaders from across the company explaining how their teams achieved Lean success.

The next Boeing Lean Enterprise Conference will be held Oct. 3 to 5 in Seattle. For more information, visit http://leo.web.boeing.com/OurJourney/PastEvents/LEC_Fall2006.cfm on the Boeing Web. ■

Meet your **FUTURE**



WORKSPACE

Glimpse into your future

The Move To The Lake effort at Commercial Airplanes' 737 manufacturing facility in Renton, Wash., features elements envisioned by the Future of Work project. With engineering and administrative teammates working near their production colleagues, the space encourages collaboration between the many disciplines responsible for designing and building an airplane.



What will the Boeing workplace of tomorrow look like? The Future of Work project is tackling this question. Their answers are intended to bolster productivity—as well as attract and accommodate employees

By STEPHEN DAVIS

By 2016, the centennial of The Boeing Company, the U.S. work force will experience a major transition.

A recent report on U.S. labor trends by the Rand Corporation points to a shift toward a balanced distribution by age, sex and ethnicity. Key trends driving this shift include increases in U.S. immigration rates and in the number of women entering the work force. In addition, in the next 10 years, members of the “baby boom” generation will reach retirement age, creating opportunities for younger workers: Those in the “Gen-X” and “Millennium” generations.

What will Boeing’s workplace be like in 10 years? The Future of Work project is asking—and answering—this question. “Our objective,” said project leader Dick Stewart, “is to think now about the future work force so we can provide a workspace that provides a foundation for productivity.”

Stewart leads a team of facility planners, human resource professionals, information-technology planners and communications experts that is centered in the Real Property Management organization of the Boeing Shared Services Group.

The FoW team directly supports the Boeing companywide growth and productivity initiatives. “The right kind of workspace reduces the costs of our facilities and improves their functional productivity,” he said. “Our plans include bringing Lean production practices into the office environment.”

“Our work force will undergo significant changes in demographics, expectations and ways of doing business. This project is proactively addressing these leading-edge changes,” said Mary Armstrong, president of Boeing Shared Services Group. “It also is part of Shared Services’ ongoing effort to provide Boeing with a cost-effective, reliable business infrastructure; and execute an effective, integrated real-property strategy.”

Rick Stephens, senior vice president of Human Resources and Administration, noted that HR is exploring a number of important aspects about the future work force, including generational and cultural preferences.

“Our focus must always be about creating value and a competitive advantage for Boeing,” he said. “Our research will influence recommendations for flexible and creative work environments that

MICHELLE LITVIN PHOTO, COURTESY OF NBBJ

SSG's new headquarters a model of office flexibility

The new headquarters for the Boeing Shared Services Group builds in the workplace flexibility future workers will demand, while integrating Lean concepts. The relocation to the Triton Towers 3 building in Renton, Wash., occurred this spring. Key to the novel space design: furniture on rollers and reconfigurable spaces that let teams rearrange themselves around the changing needs of their work. Shared offices, shared desks and more meeting spaces add to the built-in flexibility.

Here's what two employees in Triton Towers had to say about the site.

"I can bring my laptop and just plug in as if I had a dedicated office," said Rupali Shankar, Business Operations specialist for the Shared Services Group. "There are shared network printers, phones and everything I need. The convenience makes me more productive. It allows me to take control of my work. It's in my hands now. I am able to set up meetings wherever I am. I have so many options for workspaces. This environment adds an exciting and new perspective to my daily work."

"If I'm a few minutes early to a meeting or between meetings, I can just touch down and fill in the time with productive work," said Carie Burkey, SSG Human Resources staff analyst. "Also, I like that the building has



GAIL HANUSA PHOTO

Rupali Shankar (left) and Carie Burkey are among the employees who use and appreciate the flexibility of café-style "touchdown" workspaces at the Triton Towers site in Renton, Wash.

many different options for collaboration—open meeting areas, small privacy rooms, workrooms and conference rooms. I don't have to tie up a large conference room for a small meeting."



GINA VANATTER PHOTO

Boeing has 21 hoteling centers across the United States, including this one in Long Beach, Calif.

work his team does, Nufer said, "can be done anywhere. Now, you have to provide an office setting so people can meet with teammates, customers and suppliers. But for the balance of their time, my team can go home and do work productively. We've seen improved productivity."

Hunting Beach, Calif.

"It's very empowering to be a virtual office employee," said Jennifer Wong, a software quality engineer on the Future Combat System program for Integrated Defense Systems. "Depending on what kind of work I have to do that day, I can adjust my environment. If I have to run to meetings and need to check in quickly, I can go to a 'touch down' desk. If I have to do a lengthy document review, I reserve a 'heads down' desk with a large monitor for my laptop. If I need a space for teaming, I can use a conference room."

"At first, the group was apprehensive" about moving to a virtual workspace setup, said John Shyne, a manager in Shared Services Group's Site Services organization. "They said it felt like they were losing their personal space. But that was quickly overcome when they realized they didn't have to drive to work every day, and that everything they needed when they did have to come in was in the hoteling centers. ... Employees in the future will require them. If they can't have them, they'll look elsewhere."

Boeing has 21 hoteling centers around the United States. To learn more about these facilities, visit <http://virtualoffice.web.boeing.com/hoteling> on the Boeing Web.

Hoteling centers: Worth a visit

Boeing employees are boosting their productivity and finding balance in their lives today as telecommuters and participants in the Boeing Virtual Office program. Many find the company's network of the company's hoteling centers provide a convenient compliment to their personal workspace.

Here are some accounts of how hoteling centers help employees—and Boeing.

St. Louis

"To new employees, [virtual office arrangements] are an incentive to come join us," said Kurt Nufer, an Information Technology manager in St. Louis about his team, which uses hoteling space. Much of the programming

enable greater productivity and performance by our work force.”

COMPETING FOR KNOWLEDGE WORKERS

The demographic composition of the work force at Boeing, like other technology companies, reflects the aging of the baby-boom generation (those born between 1945 and 1964). The average age of Boeing employees is 46. About two-thirds of Boeing employees are eligible to retire in 10 years. If these employees choose to retire, or even delay their retirement until the average age of 60, the company can expect up to 8,000 employees to retire each year over the next 10 years.

It may be difficult to replace them. The “baby-bust” Gen-X generation, made up of individuals born between 1965 and 1984, is smaller than the boomer cohort. Boeing’s competitors, facing the same demographic trends, will be recruiting just as hard. “Boeing’s competitive advantage depends on identifying, attracting and retaining the critical skills found in the marketplace,” said Donna Wildrick, senior manager, Recruitment Advertising in Boeing Global Staffing.

Data from the U.S. Bureau of Labor Statistics point to a tightening in the labor market for U.S. knowledge workers in the next 10 years. The labor pool will grow, but at a slower rate than in recent times, while job growth is likely to continue at a strong rate.

Smart companies, most HR consultants said, will adapt by pursuing technologies that increase worker productivity, as they’ve done so well over the last 10 years. Such firms will focus on retraining employees for new tasks, reducing turnover, expanding recruitment to mid- and senior-level workers, and providing flexible workplaces and work practices to retain the right people, HR analysts said.

To compete for the highly skilled worker, Boeing will need to accommodate differences—not only those based on gender, ethnicity and national background, but on age as well (see story on Page 16). “A diverse work force is to our competitive advantage,” Wildrick said.

THE FUTURE OF WORK CONCEPT

The Future of Work project envisions new office standards, creating new work practices and creating new connections between Boeing, workers and their communities. “The right space is a tool of the right behavior,” Stewart said. “It must reflect our culture.” It’s also an opportunity to reinforce the Boeing brand, which aims to emphasize that Boeing people do amazing things every day.

The project is built on these concepts.

Office standards build in collaboration and connection. As succeeding generations emphasize collaboration and teamwork, space design will include more meeting rooms, chat spaces, team workrooms and gathering places. The information-technology infrastructure will adapt to accommodate groups working together across space and time.

Hoteling centers are examples of the new office standard. Boeing now has 21 of them at sites across the country—three times the number since year-end 2004. They leverage Boeing’s information technology infrastructure that lets the company’s global work force be linked at any time of the day. Hoteling centers provide an office environment with supporting services to employees who are traveling or who otherwise work away from a traditional office (see story on Page 14).

Today, the usage rate of all hoteling centers exceeds 50 percent for workstations and tops 70 percent for conference rooms.

Work environment and practices provide flexibility. The work environment should provide increased flexibility to accommodate the demands of family and leverage the benefits of the outside community.

Increasingly, work practices are accommodating employees willing to blend work and family life. Indeed, this may be crucial to retaining the boomers, some of whom may choose semiretirement as



MARIAN LOCKHART PHOTO

At the Employee Service Center in Renton, Wash., Danny McBroom of the 737 program reviews information about a financial program with Tammy Hayden of the Boeing Employees’ Credit Union. McBroom appreciates having a BECU office in the center.

‘A great addition to the site’

The 4-81 building in Renton, Wash.—where Final Assembly of the 737 takes place—features an Employee Service Center (ESC). The center offers Boeing employees amenities such as dry cleaning, photofinishing and banking services. The facility supports the Future of Work initiative, which envisions services currently found outside the plant or campus becoming increasingly available inside the workplace. Among the 4-81 employees who are grateful for the facility is Danny McBroom, a lead inspector in the Quality organization supporting the 737 program. Here’s why McBroom appreciates the ESC, as told to Debby Arkell of the Boeing Frontiers staff.

My first thought when I heard Boeing was going to open an Employee Service Center here in Final Assembly, offering services such as dry cleaning, DVD rentals and banking, was “That seems crazy!” But now it makes perfect sense to me. I’m an hourly employee with a 30-minute lunch break. Banking is a common errand for me. It’s about seven miles from here to the [Boeing Employees’] Credit Union. If I need to run an errand like that at lunch time, it’s a 10-minute walk to my car from where I work and 10 minutes back. That leaves me 10 minutes to drive there and take care of business.

I use the center’s banking services most of all, but I like that I can also get things notarized, rent DVDs, ship packages or learn how to use online banking. Having BECU staff right here at the Employee Service Center relieves a lot of stress, and I no longer have to worry about planning and rushing my errands during the day or after work.

It’s a tremendous benefit to employees, and I think that it’s very accommodating and convenient for hourly people in particular. It really helps me use my time more efficiently, freeing up my time after work so I can continue to work as an umpire off-hours. That’s really important to me.

I think the company benefits, too. It gets more productivity out of people, for sure. It keeps us in the workplace, and we don’t have any worries about being late or getting into trouble if the errand takes longer than we anticipated. By providing ESCs, the company is sending a message to employees that it’s trying to help us do our work, and that it wants to make life more enjoyable for us. I feel the company is taking the time to think of us, and it’s the little things like ESCs that make the difference.



PETER GEORGE PHOTO

Members of an Information Technology team gather in a conference room at the virtual office facility in Building 73 in St. Louis. The team, which includes virtual workers, uses a conference room every Thursday to conduct a teleconference with a supplier.

they age, as well as attracting “Millennium Generation” members—born between 1985 and 2004—who have little difficulty blending all elements of their lives.

Right now more than 11,000 Boeing employees have work agreements with their managers to work away from the traditional office—from hoteling centers, the offices of business partners or customers, or from their own homes. These telecommuting and “virtual” work agreements create clarity about employee and business expectations, goals, and objectives, and about how communications with business partners and customers will be maintained. The 2005 Boeing Employee Survey results show those with these virtual work agreements feel as connected and engaged with their work groups as those who work in a traditional office setting.

Workspace connects brand and community. The FoW concepts encompass a stratified approach to brand communication: It creates a sense of pride from within, in the amazing things the company’s people do—and inspires awe and wonder among those outside the company. Emphasizing the Boeing brand supports the company’s greatest recruiting tools: current employees.

At public entrances, visitors and employees see brand images that link Boeing to the community and customers. As a person enters, the Boeing brand images become related more closely to the work being done in the space.

FoW envisions a layout for workspaces, buildings and campuses that provide a sense of continuity and connection with the community. Accessibility to the community will encourage employee service and continuing education.

Services now found outside the plant or campus will become

Let’s get persona(l)

Who’s the Future of Work project serving? Here’s a glimpse at who Boeing’s workers of 2016 could be—and what they might want in the workplace

In the next 10 years, about two-thirds of Boeing employees will be eligible to retire. What’s assured in these 10 years is a workplace developing with a diversity of work styles.

With the help of Callison Architecture, the Future of Work project at Boeing looked hard at what this generational shift will bring. The FoW team’s efforts ultimately focus on creating workspaces that help make Boeing and its employees more productive—and meet the needs and expectations of these diverse employees.

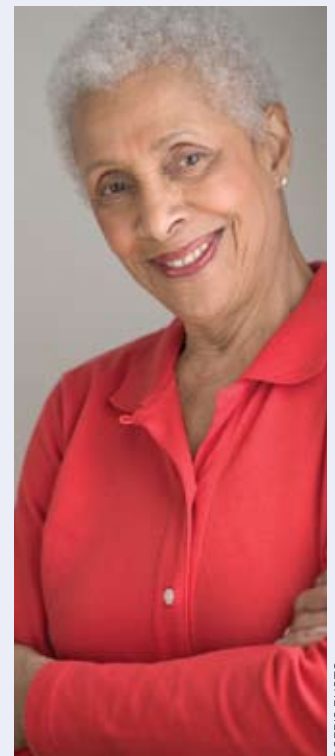
To help the team understand the needs of Boeing workers, Future of Work team members assembled fictional personas of three typical Boeing employees in 2016, with each persona representing a key demographic group. These personas are not based on actual individuals; indeed, descriptions of some personas include mentions of technologies that aren’t commonly available today. But they show the predicted collective needs, expectations, interests and attitudes shared by members of each demographic range in 2016.

Here’s a look at each persona.

Baby boomers

Boomers, born 1945 to 1964, make up about 80 percent of Boeing’s current work force. They tend to be loyal to their employers, averaging more than 20 years with the same firm. They tend to work best individually and coordinate with a larger work team.

The 2016 persona: Jonna joined Boeing 30 years ago as a planner. She’s now an advisor to a Boeing new-product development team, working part time. “Semi-retirement” has allowed her to turn her hobby into her work—as an antiques dealer. She loves travel and works 24/7 to serve her global customers—both in Boeing and for her own business. She travels constantly, so she needs the ability to communicate from any location around the globe. She feels strongly committed to Boeing and volunteers for one of the company’s community education programs as a graphics art teacher.



CORBIS PHOTO

increasingly available inside the workplace. New arrangements to share large Boeing meeting spaces with community groups will increase the sense of community connections. Indeed, the Move To The Lake effort at the Commercial Airplanes plant in Renton, Wash., personifies elements of this philosophy. Engineering and administrative offices were moved into the 737 plant in 2004 so individuals supporting these functions could be alongside the assembly line. The integrated space creates an environment that encourages collaboration between the many disciplines responsible for designing and building an airplane. Renton also features an Employee Service Center that gives employees easy access to services such as dry cleaning and photo processing—without making the long trek out of the plant (see story on Page 15).

FOW'S NEXT STEPS

“From all of our research,” Stewart said, “we have learned when it comes to our future work environment, one size does not fit all. The generational difference and the wants and needs of our future and current employees will be changing.”

Another major insight of the research, Stewart said, is the need to integrate a variety of functions to create the lean, productive infrastructure Boeing’s future business will need. Facilities, information technology, security, community relations, communications, hiring and training all play important roles.

SSG Real Property is working now with business partners in these functions across the Boeing enterprise to build cooperative, future-oriented strategies.

“There are steps we need to make in 2006 and every year thereafter to create the workplace of 2016,” Stewart said. “Our challenge is to offer our employees a workplace that enables their success and the continuing success of our company.” ■

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Training the work force of tomorrow

In the world of training and development, flexible work habits, informal learning and cutting-edge technology will be key components that both appeal to and allow the future work force to be most effective.

According to Rick Coffey, director, Manufacturing, Functional, and Employee Development—a part of the Learning, Training and Development (LTD) organization—plans include expanding online learning programs to allow individuals to access more training courses from home or work computers. Coffey also said Boeing is exploring ways to develop module-based learning, customized to the individual’s specific needs, to reduce the time necessary to complete training requirements.

For engineering, Boeing will focus on access to informal learning that spans current and developing technologies. Jon Schneider, director, LTD Engineering, said employees will have a variety of tools at their disposal, along with the freedom to decide how best to utilize those tools to meet their needs and preferences. “Employees will not be limited or constrained within a formal, structured learning environment. Instead, they will use methods such as podcasting for listening to and viewing technical information,” Schneider said. Other means, such as “wikis” (Internet tools to collectively manage information), will allow employees to capture, access and share knowledge to help them collaborate on projects, he added.

Additionally, as more employees work virtually throughout the enterprise, managers will have to become adept at managing a widely-dispersed work force.

Current courses, such as “Managing the Performance of Virtual Teams,” help managers make the most of performance management skills that include setting expectations as well as monitoring, reviewing and providing feedback on progress, said Janet Anderson, curriculum designer. “These are skills that all managers should possess irrespective of what technologies are available or whether they are managing a group of employees who work virtually or nearby,” she said.

—Robert Sterling

Generation X

Born from 1965 to 1984, Gen-Xers are also called the “baby bust” because this cohort is about 16 percent smaller than that of the boomers. In 10 years, this group will make up 50 percent of the work force. They’re comfortable changing jobs frequently to pursue their career goals.

The 2016 persona: Wyatt is 44 years old with a 13-year-old daughter, Zoe. She’s a tomboy and follows her dad everywhere. His wife, Apple, 39, is a freelance graphic designer. The family enjoys hiking and extreme sports. They share one car, a hydrogen-powered 2012 Honda Element. Wyatt likes to ride his bike to work, which gives him exercise and time for self-reflection—and lets Apple use the car during the day. Wyatt and Apple would like to have another child but don’t have the space in the house. Currently they’re looking for a lot for their new Honda Modular home.



CORBIS PHOTO

Millennium Generation

Members of this generation, born between 1985 and 2004, will be entering the work force by 2012. Indeed, the oldest members of this generation will be 31 by 2016. This generation is larger than the baby bust. They are growing up in ways that cultivate collaboration. For them, social networking is crucial and being online and electronically connected is natural.

The 2016 persona: Jack, a new hire, writes and produces his own music. He is connected to a global community. He questions sources of information and is a bit selfish and introspective. His work is his play and vice versa. He has global/remote “buddies” he can communicate with at any time. He is a multitasker and is always connected at the computer and via cell phone.



GETTY IMAGES PHOTO

The 787 Dreamliner program continues to make progress. Among the program's recent announcements: The first 787-9 Dreamliner will be delivered to Air New Zealand. ANZ last month converted its original order for four 787-8 airplanes to four slightly bigger 787-9 airplanes. Delivery of the first 787-9 is scheduled for December 2010.



Dreamliner becoming reality

787 still going strong, 2 years after launch

By ADAM MORGAN

April 26, 2004, started the journey of turning dreams into reality with the launch of a new member of Boeing's family of airplanes: the superefficient 787 Dreamliner. In the two years since that day, the hard work of Boeing employees and supplier partners worldwide continues to move the 787 program closer to its world debut and entry into service.

The Dreamliner is the most successful new airplane launch in the history of Boeing. To date, 29 customers have made orders or commitments for 393 airplanes. Of these, 350 are firm orders worth roughly \$52 billion at current list prices. The first three years of production are sold out, and demand for subsequent years is high.

"Every way we look at it—the number of customers, the variety of customers in terms of location and business model, the number of orders and even repeat business—we couldn't be happier," said Mike Bair, vice

president and general manager of the 787 program. "We are bringing the right airplane to the market."

In the past 24 months, the 787 team has demonstrated the composite manufacturing technology that will allow the Dreamliner to be made primarily of this superior material.

Nine composite fuselage sections have been manufactured at facilities in Seattle and Wichita, Kan. A demonstration wing box has also been built in Seattle (see Page 12 of the April 2006 issue of *Boeing Frontiers*). Extensive testing on systems components is also under way at sites around the world.

The first Rolls-Royce Trent 1000, the launch engine for all three 787 versions, completed its first test run this February at the Rolls-Royce facility in Derby, England. The engine was started electrically with the new IP Power Offtake, which acts as an electric starter and was designed specifically to match the requirements of the more-electric 787. Certification of the Trent 1000 will occur in summer 2007, shortly before it powers the 787's first flight.

In addition, in March the first General Electric GENx engine for the 787 reached 80,500 pounds of standard day sea-level takeoff thrust at GE's test facility in Peebles,

Ohio. GE later inspected the engine hardware and found it to be in excellent condition. That engine is one of seven GE will test this year for the 787 certification program.

Boeing is bringing the best in the business from around the world together to build the Dreamliner. While the team of companies participating directly with Boeing on the 787 is smaller than on past programs (with larger work packages being contracted to fewer companies), the total team including sub-tier contracts involves companies from about two dozen countries.

With more than 3 million square feet of new factory space being built worldwide to support manufacturing of the Dreamliner, the project is the world's largest industrialization effort. There are now 135 sites around the world designing the Dreamliner through the use of new digital design tools provided by Dassault Systemes.

Much has happened in these past two years; and the next two years, Bair said, will be equally challenging and exciting. "Within that time frame," he said, "we will have built our first several airplanes, started our flight test program and be well on our way to certification and first deliveries." ■

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BOEING GRAPHIC

Created by unseen hands

Meet the site that uses innovative fabrication technology to ‘grow’ parts to exact specifications

By KATHRINE BECK

A new technology is making it possible to watch parts literally build themselves—exactly according to design drawings.

When an Asian carrier arranged for a re-design of its 777 interiors from an outside firm, one of the new design elements was a foot-level lighting fixture, similar to those in a cinema aisle, to make it easier to walk around the cabin in the dark. The widebody Lighting Development group in Everett, Wash., had to engineer a stainless steel part that would hold the light’s lens in place.

The design firm’s vision called for a complex shape, recalled engineer Nicole Miller. Adding to this challenge: The production run was for just 19 airplanes, and the parts were needed quickly. Miller’s group consulted Mark Negley, Phantom Works mate-

rial and process engineer, who came up with the solution. He told them about the Rapid Prototype Manufacturing organization at the Puget Sound Developmental Center, part of the Commercial Airplanes Engineering and Manufacturing organization.

The RPM lab owns one of four EOS M270 direct metal deposition machines in North America. It can build a part layer-by-layer from stainless steel powder by using a computer-guided laser operating in a glassed-in nitrogen environment. The technical term for the process is sintering—getting particles to coalesce into a solid mass under the influence of heat without liquefaction. The EOS M270 builds the part by using a solid-model data file derived from computer-aided design (CAD) drawings of the part.

Russ Martiens, the project engineer on the EOS M270, is responsible for the lighting part having become the first production

part in sintered metal on an FAA-certified aircraft. Watching the manufacturing process through the glass is like seeing something created by unseen hands. The laser dances spectacularly across a metal plate like a Fourth of July sparkler, heating just the portions of powder needed to form the object. When the parts are done, they are sawed off the metal plate, polished and trimmed.

This process demonstrates the capabilities of the RPM, which uses processes known as “additive technology” or “e-manufacturing” to build objects in a whole new way. If traditional fabrication techniques are about removing parts of a material to create an object, this technology is more like growing them.

“There’s lots of potential for additive manufacturing technology to save money, decrease weight and reduce part count by combining several parts into one complex component,” Negley said.

The same technology can be used to build titanium parts in a helium environment and aluminum parts in an argon gas environment. Les Tardiff, RPM manager, says if Boeing customers have a need for these capabilities, he’d be glad to add them.

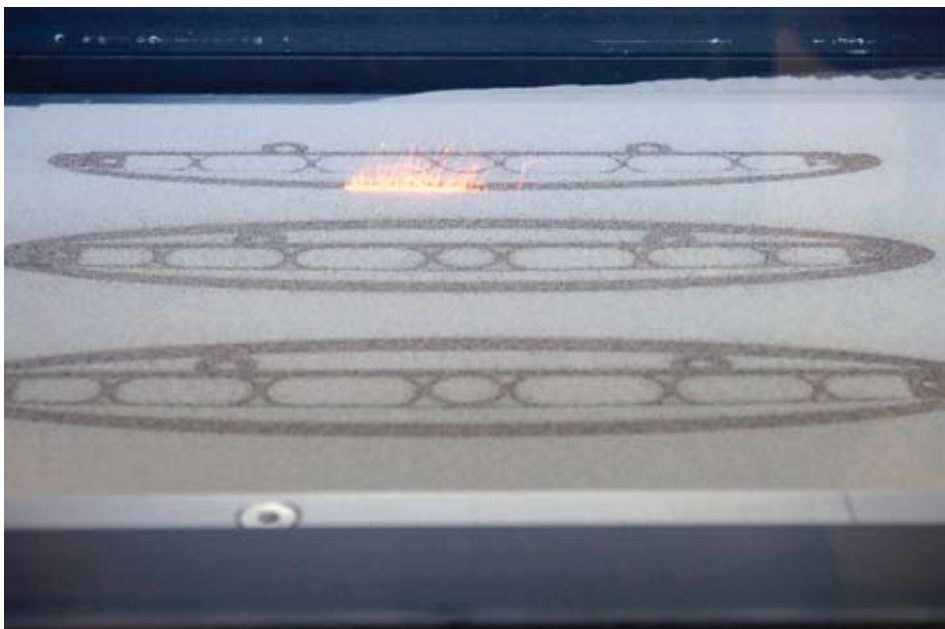
RPM already has a variety of other e-manufacturing machines available. Its stereolithography machines build epoxy objects by tracing a laser beam on the surface of a vat of liquid photopolymer. The computer-guided laser beam turns the liquid to solid in places where the object needs to be formed. After a layer of about 1/5000th of an inch is finished, the growing part is automatically lowered a small distance into the vat, coating it with a fresh film of resin, and a second layer is traced right on top of the first. The layers form the complete, three-dimensional object.

Not only can e-manufacturing equipment create objects from data files, it also can reverse engineer—scanning an object and developing the electronic data files to program a machine to make a clone.

Besides making parts and test and display models for Commercial Airplanes customers, RPM also provides its expertise and production capability to other business units.

Said Tardiff: “We can save customers all kinds of time and money because we can do it quickly and cheaply, sometimes overnight.” ■

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JIM ANDERSON/PHOTO

A computer-directed laser beam solidifies metal powder to build a part in the EOS M270 machine in the Rapid Prototype Manufacturing lab. The laser heats just the portions of powder needed to form an object.

Ready to carry the load

747-400 Converted Freighter team set to meet heavy demand

By KATHRINE BECK

Last December, launch customer Cathay Pacific Airways took delivery of the first Boeing 747-400 passenger airplane to be converted to a freighter as part of the 747-400 Boeing Converted Freighter program.

Now, thanks to big demand, the BCF program is ramping up. The program has announced 43 firm orders and 23 options, and eight conversions are scheduled for 2006. That demand means the team has a lot of work on its plate—but it's a task the team is ready to tackle.

"It's going to be a challenge. But everybody is pulling together, and we've already accomplished a lot together," said Rich Dustman, BCF chief engineer, about the schedule ahead. "It's going to be spectacular."

The 747-400BCF's success is in large part because the burgeoning economies of Asia need more cargo capacity. BCF allows airlines to enhance the value of their older 747-400s by converting them to freighters to add that capacity. This gives Boeing not only the revenue from conversions but an opportunity to sell those airline customers new 777s and 787s for passenger use.

Converting a 747-400 is a big job. The interior is stripped out, floor beams are removed and replaced with beams that can take more weight, a hole is cut into the side of the plane and a large cargo loading door installed. These and other modifications require extensive changes to flight control cables and airplane systems. The airplane must also meet new safety standards and be recertified to carry heavier payloads.

Just as the demand for converted freighters has been driven by an increasingly global economy, the conversion operation is global in scope. It takes place in several locations around the world.

There are two approaches to the conversion. In some cases Boeing is providing customers with freighter kits, including engineering service bulletins, parts and on-site support. The airline provides the "touch" labor. Two modification sites are now coming

online in Korea and Singapore. Other modifications will be performed at the Boeing joint venture Taikoo (Xiamen) Aircraft Engineering site, known as TAECO, in Xiamen, China, with Boeing retaining full responsibility, from marketing and sales through redelivery and continuing into service.

There are also three primary engineering sites—in the Puget Sound region of Washington State, in Long Beach, Calif., and at the Boeing Moscow Design Center—as well as liaison engineers at modification sites.

Marco Cavazzoni, director of the 747-400 BCF program, said the program was based on the Vision 2016 commitment to lean, global, large-scale systems integration, and on the Commercial Airplanes strategy to promote point-to-point travel in newer 777s and 787s.

"The BCF operational model enables us to offer a viable new product to the industry, while providing additional multibillion-dollar industrial activity in both the United

States and Asia," he said. "This is industrial activity that we would not have in the United States without leveraging the power of the Boeing enterprise worldwide."

The key to managing the ramp-up is seamless integration of all these sites, Cavazzoni said. The program has a rigorous line-of-sight program management process to review performance of these groups. That lets the team establish a global production-system backbone providing real-time technical, program-management and status data, he said.

The worldwide team also meets frequently and on a regular schedule. "At the end of the day in Puget Sound, when Asia wakes up we have telecons [teleconferences] with conversion sites, and at the beginning of our day we have telecons with Moscow," Cavazzoni said. "If, for example, a problem is generated in Asia we get all of our [next] day to work it. While we sleep, they work. There's a tremendous amount of power in that model." ■

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Korean Air is one of several cargo operators that will receive a 747-400 Boeing Converted Freighter in 2006. The Korean carrier's airplane is shown here in "mid-conversion" at the TAECO facility in Xiamen, China.





A Boeing team is using the Acquire Business Center in Philadelphia to collaborate more effectively on the Combat Search and Rescue (CSAR-X) proposal. At Langley Air Force Base, Va., Boeing recently displayed a mockup of its CSAR-X entry (left) in the U.S. Air Force competition.

Their business is new business

These 12 centers have tools, knowledge to help teams win campaigns

BY KATHERINE SOPRANOS

At Integrated Defense Systems, putting together winning campaigns in a highly competitive marketplace, for customers with sophisticated needs, is an enormous, complex task. Where do you start? The Acquire Business Center—a one-stop shop that gives IDS capture teams the support to pursue new business campaigns more efficiently and effectively.

Established by IDS Business Development, Acquire Business Centers provide leadership, expertise, training, processes and tools, and hands-on support for IDS and Phantom Works teams pursuing new business. There are 12 centers at Boeing locations across the United States (see box at right).

“The foundation for a winning proposal is laid up front in the campaign,” said Mike

Scholes, director of IDS New Business Acquisition, who leads the Acquire Business Centers. “We provide comprehensive support for the entire new-business campaign. We’re focused on well-executed campaigns that produce winning proposals and grow our business.”

The centers, Scholes said, create value by providing expertise along with proven processes and tools, resulting in more efficient and cost-effective use of Boeing resources. The current Integrated Business Acquisition Process includes more than 15 years of lessons learned from the companies that now make up IDS.

The centers are designed so teams can collaboratively work on new business campaigns, across locations if needed, and have everything they need at their fingertips. Resources include

- Industry-leading best practices and hands-on workshops.
- Archived lessons learned, including customer debriefs.
- A library of successful past proposal write-ups.

Employees tasked to lead campaigns are

called Capture Team Leaders. The Acquire Business Center has established a development program to train and certify CTLs. Cindy Malawy, IDS director of Business Development Operations, said the program’s vision is to identify, attract and develop experienced and skilled IDS people to become CTLs. Previously, team leaders were found by word of mouth. Now, the center has formalized CTL development to ensure these leaders have the needed training and tools.

For Capture Team Leader Van Horn, the Acquire Business Center in Philadelphia has been invaluable. “I’m not sure how you could put proposals together without a function like this,” said Horn, director of Business Development for Special Operations Command—Central Command, who leads the campaign team for the Combat Search and Rescue (CSAR-X) proposal. The CSAR-X program is a U.S. Air Force initiative to replace existing CSAR platforms with a modernized and more capable platform. Boeing is proposing the HH-47 aircraft, based on the CH/MH-47 helicopter (see Page 20 of the May 2006 issue of *Boeing Frontiers*).

“We would not have as good a product if we hadn’t had the resources of the center,” Horn said. “They provide expertise, processes and tools that really help bring it all together.” ■

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Centers of business

There are 12 Acquire Business Center locations in the United States.

Alabama: Huntsville

Arizona: Mesa

California: Huntington Beach, Long Beach, Seal Beach

District of Columbia: Washington

Kansas: Wichita

Missouri: St. Louis

Oklahoma: Oklahoma City

Pennsylvania: Philadelphia

Texas: Houston

Washington: Kent

For more information, visit <http://stlwww002.web.boeing.com/cgam/abc> on the Boeing Web.

www.boeing.com



Boeing recently launched a series of new ads in support of airline sales campaigns around the globe for the 747-8 Intercontinental. The above ad, the first in this series, captures the excitement of this product launch. It also lists some of the airplane's primary benefits, such as new and more fuel-efficient engines and a new interior. This advertising campaign will be featured in Asia and Europe, as well as in trade publications throughout the world.



WHOSE TIME HAS COME. AGAIN.

THE NEW 747-8 INTERCONTINENTAL.

It couldn't have happened at a better time. A new 747. Redesigned with the most fuel-efficient commercial airplane engines in the world. And a new standard of comfort from nose to tail. A cleaner, quieter, more efficient 747. It's a big idea that's ready to put a big smile on the face of passengers and airlines alike.





NASA PHOTO

BEAT THE HEAT

Boeing team develops tiles to make shuttle safer, easier to maintain

By BOB HOWARD

Karrie Hinkle's favorite hobby is cooking good things. Picking the perfect ingredients also makes her an outstanding Boeing chemist, one who spearheads the kind of innovation that makes NASA stand up and take notice—especially when it affects Space Shuttles.

Each NASA Shuttle is covered with more than 21,000 lightweight heat-insulating "tiles" that protect the Shuttle and crew from the searing heat of atmospheric reentry. Flying at 17,500 miles per hour, this 20-minute descent generates friction and, ultimately, a scorching environment hotter than molten lava.

Yet these tiles are so good at quickly throwing off intense heat that you can hold this material with your bare fingers just seconds after it's been taken, still glowing red hot to the core, from a 2,200-degree furnace.

As part of its preparations for a scheduled launch in July on mission STS-121, Space Shuttle *Discovery* was transported last month to NASA's Vehicle Assembly Building at Kennedy Space Center, Fla. Boeing has improved Shuttle tiles substantially.

The tiles, however, are fragile and therefore prone to damage.

Boeing has improved Shuttle tiles substantially by developing Boeing Rigid Insulation (BRI), which is five to 10 times stronger and more durable than any tile used before it. For NASA and the Shuttle crew, this means maintenance costs decrease and safety margins radically increase.

"Chemistry is like cooking. What we did is like cooking high-temperature cake," Hinkle said. "You mix the right amount of the right things and cook at the right temperature. The result is a stronger, safer tile."

While ceramics engineer and chemist Hinkle picked out the new ingredients, it was Vann Heng and MaryAnn Santos, both Boeing materials engineers and scientists, who actually developed BRI. They rounded out this three-woman team, which earned a U.S. patent for its work.

Heng and Santos' job was to painstakingly develop how to mix and cook the new tile to get the best strength and thermal efficiencies for when the tile was doing its job. They spent several years changing the formulation and fine-tuning each of the processes. Then, of course, the material was tested extensively.

"With BRI, we took something we had reason to believe would work, and Vann and MaryAnn mixed it into the normal tile mixture," Hinkle explained. "They really did the important development work on this, experimenting to develop the right 'cooking' temperatures and right amounts of ingredients."

Most Space Shuttle tiles are made with pure silica oxide fibers. A Space Shuttle tile is super-light because it is 90 percent air and 10 percent silica fibers. It resembles and feels like Styrofoam. Dive down into this material, magnifying it hundreds of times, and its fibers look like a loosely woven bird's nest. This porosity helps the material throw off heat.

Yet some Shuttle areas experience higher temperatures than others. To address these differences and make BRI, the trio added alumina oxide, because it can take higher re-entry temperatures without allowing warping. A pure silica tile might deform and influence an adjacent tile.

Then their breakthrough came. "The secret to BRI, beyond adding alumina fibers, was processing them so the fibers lay flat and conducted heat out horizontally rather



JOE OLIVOS PHOTO

MaryAnn Santos (center) repositions a Boeing Rigid Insulation tile in a high-temperature furnace as she and teammates Vann Heng (left) and Karrie Hinkle complete the coating firing process by inspecting the tiles.

The next flight

Space Shuttle *Discovery* is next scheduled to fly in July on mission STS-121. In this mission, the spacecraft will head to the International Space Station with the Multi-Purpose Logistics Module carrying thousands of pounds of sustaining equipment, food, water and other supplies to crewmembers there.

For more information on the ISS, visit http://www.nasa.gov/mission_pages/station/main/index.html on NASA's Web site

For more information on STS-121, visit http://www.nasa.gov/mission_pages/shuttle/shuttlemissions/sts121_overview.html on NASA's Web site

The prime contractor for Space Shuttle operations is the United Space Alliance, a joint Boeing-Lockheed Martin venture.

than in, vertically, toward the Shuttle's skin," Heng said.

Because the alumina fiber makes the BRI tile free from warping, it also could take advantage of a surface treatment invented by NASA. This toughened the tile's outer surface and gave it five to 10 times higher resistance to damage. The treatment involves infiltration of small particles into the tile's surface, thus filling in between the bird's nest silica strands. The introduction of this material improved resistance to impact damage.

"Technicians are putting new BRI tile on *Discovery* in the hotter, more critical areas, like the nose landing gear doors. We expect to see a couple of dozen installed on that Shuttle before we fly mission STS-121," Hinkle said.

Then, more than 700 of the new BRI tiles will be installed in selected, critical areas of each Shuttle—the underbelly, wing tops and bottoms and the window areas—to offer more protection than ever. Boeing continues

to issue the blueprints for this work, planned over the next four years.

The BRI fabrication work was done at the Huntington Beach Development Center in California. NASA relied heavily on Boeing's Huntington Beach team and this center when preparing Space Shuttles to fly again after Space Shuttle *Columbia* tragically broke up on re-entry in 2003.

All in all, it's been quite a ride getting to this level.

"We developed each other's potential," Santos said. "We were open-minded with each other's ideas all

through the development process. This was important as we were limited in both time and budget.

"When there was a question about which idea to use, we analyzed logically, practically, to arrive at a consensus for which was best," Santos added. "We couldn't get this far if we were limited to just a few ideas. We needed everybody's ideas." ■

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"We couldn't get this far if we were limited to just a few ideas. We needed everybody's ideas."

—MaryAnn Santos, Boeing material engineer and scientist



Advancing toward deployment

BOB FERGUSON PHOTO

FCS team on track to deliver transformative technologies to Army

By JAY SPENSER

Future Combat System—the centerpiece program of U.S. Army modernization—recently completed a virtual exercise in which the individual components of FCS operated together for the first time.

This debut simulation event, called Integrated Mission Test Zero (IMT-0), was intended to validate that FCS people, processes, procedures and products were all aligned to meet program needs for future integration events. IMT-0 marks a major step forward for the FCS System of Systems. Its success brings closer the day U.S. forces will operate in an information-rich battle space where threats are identified more rapidly, understood more fully and targeted more precisely.

FCS is a system of systems that will link 18 separate military platforms via a distributed information network (see box at right).

The result will be a battlefield where information plays a starring role, reducing the confusion and uncertainty that have characterized warfare over the ages.

The backbone of FCS is the System of Systems Common Operating Environment, a software system that will link future Army Brigade Combat Teams with one another, their remote assets, external knowledge centers and other friendly forces.

IMT-0 pitted friendly Blue Forces against hostile Red Forces in mock combat operations conducted in virtual battlespace. This pioneering exercise employed software models that depicted the ground vehicles and other FCS platforms now being developed.

Boeing Software Engineer Bryon Adamo was on the team that received those models from its FCS One Team partners and integrated them into the simulation. “It was a huge challenge, but we engineers are born problem solvers, and I enjoyed every minute of it,” he said of his experience.

The nerve center of IMT-0 was the FCS System of Systems Integration Laboratory at Huntington Beach, Calif. Program personnel—including eight active-duty Army soldiers—“crewed” the virtual vehicles on

Boeing teammates Eva Ford (left) and Jacob Ford are shown in the Command and Control center of the System of Systems Integration Lab in Southern California where the Future Combat System Integrated Mission Test Zero took place.

the digital battlefield and otherwise participated in this learning exercise.

“This test achieved all its stated objectives,” said Frank De Mattia, Boeing FCS site lead and senior program director in Southern California. “Its success shows that our large, geographically distributed team properly stood up the four Ps—the parts, processes, people and paper or documentation—and that they work together as planned.”

The FCS One Team is led by Boeing and its partner, Science Applications International Corporation. The One Team includes 23 first-tier suppliers, each an acknowledged leader in its field, along with the Army’s experts. The FCS program is valued at more than \$20 billion through the entire System Development and Demonstration Phase, which began in 2003 and concludes with the Initial Operating Capability of an FCS-equipped Brigade Combat Team in December 2014. Before then, the U.S. Army will receive selected FCS capabilities in four technology “Spin Outs” scheduled for Fiscal Years ’08, ’10, ’12, and ’14. ■

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FCS components

Future Combat System is a system of systems with many individual parts. The System of Systems Common Operating Environment (SoSCOE), the program’s expansive network, links these components, creating an integrated whole that provides the Army with new capabilities. The whole is significantly greater than the sum of the parts in FCS, which is often described as a program of 18+1+1: the platforms, the network and the soldier.

In addition to SoSCOE, FCS includes:

- Eight manned and armored ground vehicles.
- Six unmanned ground vehicles.
- Four robotic air vehicles.
- A suite of intelligent munitions.
- Unattended ground sensor arrays with state-of-the-art detection capabilities.

These systems cover the spectrum of combat functions and capabilities. Smaller and lighter than today’s conventional equivalents, they are transportable by C-130 aircraft. Modular for easy repair, they share common components for simplified logistical support. Built-in diagnostics and interactive technical manuals in the equipment ensure capabilities are always available.

Know thy enemy—and friend

Communication by satellite gives Apaches information sharing at the speed of light

By LISA DUNBAR

What started as a commercial technology to track packages is now giving U.S. Army pilots of Boeing-built AH-64D Apache Longbow helicopters communications advantages in times of war and peace.

The new technology, named Blue Force Tracking, is helping Apache Longbow pilots display and report enemy locations, display and identify friendly positions, and stay connected in a vast communications network.

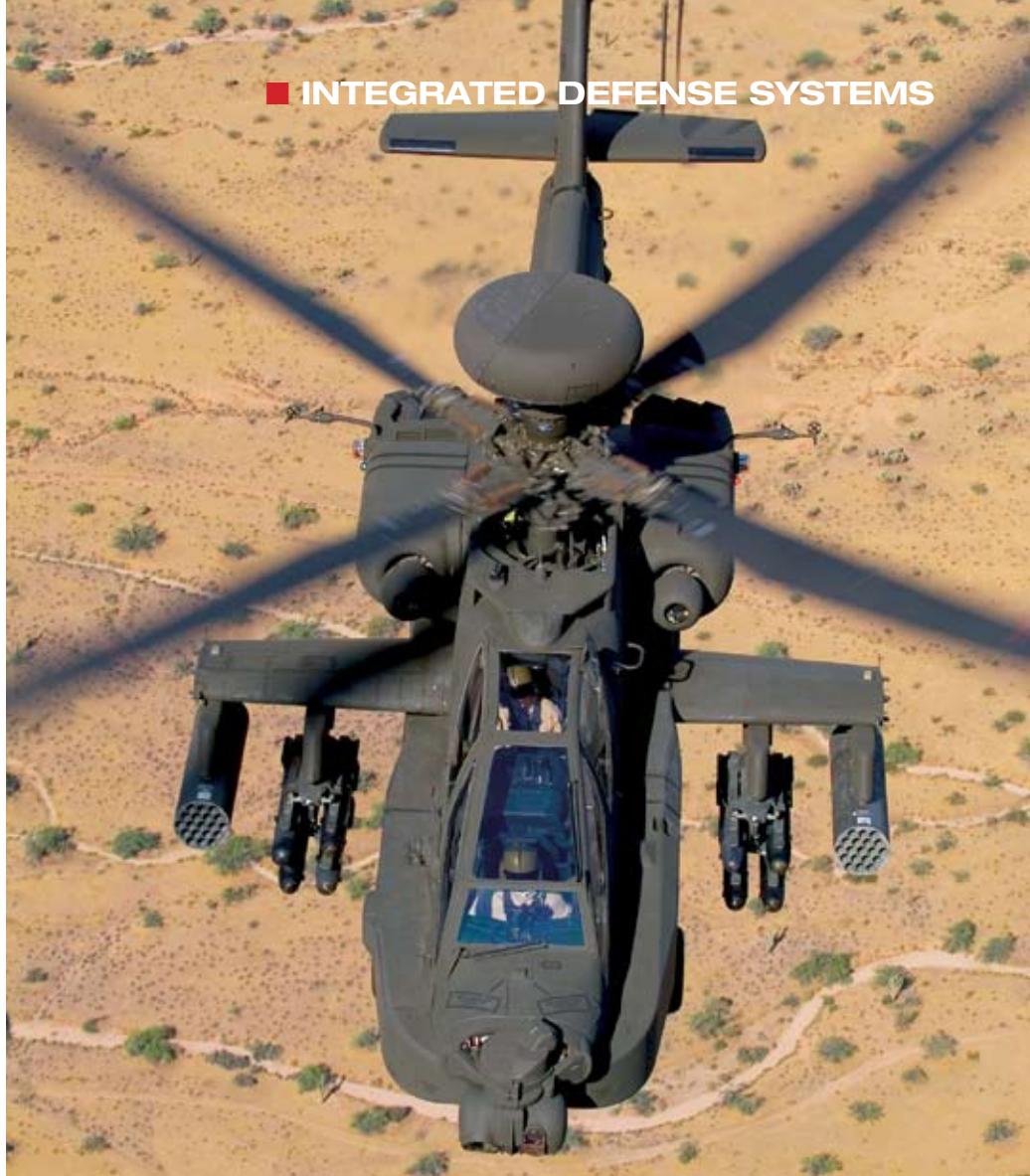
Although the Army informally began using Blue Force Tracking during 2003, Boeing signed a contract in 2004 to integrate the software into all future Apache Longbows, said Dewey Webb, program manager for the Apache Multi-Year II Digitization program.

The technology uses a satellite communications system installed on the aircraft and connected to a joint network to send data and monitor status of other tactical platforms on the network. Unlike traditional line-of-sight radio communication, mountains and the earth's curvature are not obstacles to the helicopter's satellite-communications signal path.

The information travels at the speed of light, going from the aircraft to a satellite to a ground station, then is routed back to a satellite, then to the receiver for display to the crew. Not only are friendly and enemy positions displayed, but digital messages can be transmitted and received among platforms participating in the network.

The system also has the ability to include free-text messages and automatically compose observation reports, using information contained in the aircraft's processors, to report enemy locations and information on neutrals in the area, Webb said.

The information received over Blue Force



BOB FERGUSON PHOTO

Boeing is integrating Blue Force Tracking, a satellite communications-based technology, onto AH-64D Apache Longbow helicopters. The technology improves the crew's tactical situation awareness.

Tracking is integrated into the aircraft's Tactical Situation Display and onto the digital map displays. This greatly improves crew tactical situation awareness. In fact, in Iraq, Apache pilots use the technology to keep connected to networks on the ground, report their aircraft's position and stay aware of the

tactical situation on the ground.

"The technology makes the Apache interoperable with other platforms so pilots can know where other helicopters are, where people on the ground are and where other friendly vehicle systems are," Webb said. ■

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Boeing Apaches log 2 million flight hours

The U.S. Army AH-64 Apache combat helicopter fleet, produced by Boeing in Mesa, Ariz., has logged more than 2 million flight hours, according to recently released U.S. Army operational summary data. Nearly one-third of all flight hours have occurred in the past four years, including almost 700,000 hours since the war on terror began following the attacks on Sept. 11, 2001. Apache helicopters continue to fly hundreds of hours a month in Iraq and Afghanistan in support of peacekeeping operations.

"Achieving this remarkable milestone is another indication of the importance of keeping Apaches sold," said Al Winn, Boeing vice president of Apache programs. "We're proud to provide an aircraft with the unmatched capabilities of Apache to support the defense of freedom."

Nearly 1,100 Apaches, in either the AH-64A or AH-64D configuration, are in service around the world for the U.S. Army and 10 international customers.

MISSION POS

IDS' Support Systems business unit aims to ensure warfighter readiness now and in the future

Inside

Core components: A look at Support Systems' five core businesses. Page 30

On the front line: Two members of Aerospace Operations tell of experiences supporting the U.S. Army customer in Iraq. Page 31

FIRST things first: A U.S. Navy captain gives her impression of the support provided by Boeing's F/A-18E/F Integrated Readiness Support Teaming. Page 32

'A pleasure and an honor': An F-15 field service rep talks about his daily duties. Page 33

Skilled to build: Structural Repair Facility teammates at Boeing's Williams Gateway site in Mesa, Ariz., are masters at creating better, faster and more innovative ways to repair F/A-18 components. Page 34

SIBBLE

BRUCE LOWELL PHOTO

By KATHERINE SOPRANOS

As diverse as Boeing Integrated Defense Systems' Support Systems is, its aim is razor-sharp: Warfighter readiness. Support Systems prepares military customers for their missions today and in the future, providing the men and women in uniform with the best support for their equipment and systems.

Support Systems, one of IDS' three business centers, delivers cost-effective mission readiness to the warfighter while preparing the customer for the network-centric battle space of the future. The customer relationship doesn't end once an aircraft is delivered or customers task themselves with managing older fleets: Aircraft require maintenance, repairs, upgrades and testing to ensure readiness and to extend their life span. To manage this complex and long-term task, Boeing offers aerospace and military customers in the United States and abroad the full spectrum of cost-effective services needed for mission readiness and aircraft sustainment.

"Our customers need affordable readiness to support combat and humanitarian operations," said Pat Finneran, IDS Support Systems president. "Support Systems has proven processes and trained, experienced and dedicated people who are providing the highest levels of readiness today, and we are working to improve for the future."

IDS Support Systems has five core businesses (see box on Page 30). The organization's services range from scheduled maintenance, emergency repairs and structural upgrades, to performance-based logistics, supply chain management, and air crew and maintenance training.

"Our strategy is to leverage the power of Boeing and its expertise to improve processes, systems and capabilities and to advance network-centric operations," said Finneran. "Our focused strategies will further expand our business and create even greater value—cost-wise readiness—for our customers."

Based in St. Louis, IDS Support Systems has major operations in nine U.S. Boeing locations as well as in Australia and the United Kingdom. The recent IDS reorganization, Finneran said, allowed Support Systems to align around its core competencies and strategies, remain close to the customer and better leverage business opportunities for future growth.

Support Systems features 16,000 Boeing people at 170 locations. About 2,500 people are permanently based outside the United States; 40 percent are colocated with customers, with more than 60 people in Iraq and Afghanistan.

"It's important for Boeing to remain close to the customer," said Mike Harris, vice president and program manager of the C-130 Avionics Modernization Program. "The more we know and understand their needs and how they operate, the better we can develop a more effective and safer airplane."

Under the C-130 AMP contract, Boeing will upgrade more than 400 U.S. Air Force C-130 transport aircraft to common avionics. The Air Force fleet of Lockheed Martin-built aircraft is around 20 to 30

Supporting a U.S. Army unit in Iraq, Boeing's Kenneth Long works inside an Apache Longbow Crew Trainer, a pilot training simulator, to ensure Army pilots have the highest operational readiness.

At the core

Here's a look at the five core businesses of Integrated Defense Systems' Support Systems unit.

- **Maintenance, Modifications and Upgrades.** Provides a range of services from scheduled maintenance of military aircraft to structural and avionics modifications. Also provides component and structural upgrades, depot maintenance and modification engineering.

- **Integrated Logistics.** Features fully integrated performance-based logistics services that address the complete lifecycle of each aircraft and system. Provides post-delivery military-aircraft sustainment, such as engineering, supply-chain services and technical data. Also manages Boeing Service Company, which supports satellite, launch and range operations.

- **Training Systems and Services.** Provides the full range of aircrew and maintenance training solutions, including courseware, instructors, training devices, logistics support and training centers. IDS Support Systems is one of the leading military aviation training companies.

- **Advanced Logistics Support Systems.** Develops advanced capabilities and business models to expand into nontraditional logistics and sustainment markets, including network-enabled solutions.

- **International Support Systems.** Strategically invests in and partners with aerospace companies in countries where Boeing can build and grow its business. Examples:

Australia: Boeing Australia Limited is a wholly owned Boeing subsidiary that supports high-technology aerospace modifications and communications systems for defense customers.

Saudi Arabia: Boeing partners with Alsalam Aircraft Co. Alsalam is the national aerospace company of Saudi Arabia, providing military and commercial maintenance, repair and overhaul for Saudi military and regional airplanes (see Page 25 of the November 2005 issue of *Boeing Frontiers*). Other partners in Alsalam include Saudi Arabian Airlines, Gulf Investment Corp., Saudi Advanced Industries Co. and the National Industrialization Co.

United Kingdom: Boeing has a 50-50 joint venture with Aviation Training International Limited, which provides facilities to train operators and maintainers of the British Army's fleet of Apache attack helicopters.



BOEING PHOTO

The Apache Longbow is the most advanced multirole combat helicopter for the U.S. Army and a growing number of international defense forces.

years old, with avionics that vary among aircraft. “We’re designing and developing a cockpit to make the pilot’s and copilot’s lives safer with more visibility and more head-up capabilities,” Harris said. He added that the avionics upgrade will significantly drive down the customer’s maintenance and crew training costs while ensuring higher performance reliability and extending the fleet’s life span.

Boeing also is upgrading the KC-135 aerial refueling tanker to improve the aircraft’s capabilities and is maintaining other airplanes, such as the E-4B command post.

TRANSITION TO PERFORMANCE-BASED LOGISTICS

As technology rapidly evolves and defense budgets tighten, customers’ needs are shifting from piecemeal logistical support to complete lifecycle services. With a business model called Performance-Based Logistics, Support Systems offers the full array of integrated support and services for warfighter readiness. Key programs include F/A-18E/F Integrated Readiness Support Teaming, the C-17 Globemaster Sustainment Partnership, and the U.K. CH-47 Through Life Customer Support contract to provide support to the United Kingdom’s fleet of 40 CH-47 Chinook helicopters.

As the aerospace industry moves to more integrated platforms, Advanced Logistics Support Systems has an eye on technologies and architectures that will improve current and future support systems and deliver network-centric logistics for greater warfighter readiness.

“We’re transitioning the technologies, processes and tools that

continued on Page 33



Boeing employees supporting a U.S. Army unit in Iraq to provide Apache Longbow Crew Trainer maintenance are (clockwise, from top left) Richard Schottlaender, Richard Partin, Kenneth Long and Bruce Lowell.

The team works to keep the pilots' skills sharp by having them practice combat tactics and critical scenarios they might experience during a mission. For example, they practice bad-weather flight, and for radio, engine or power failures.

Their job is more involved than just serving the customer on site. It's a camaraderie shared with the unit and pitching in to help the customer in any way they can with limited resources.

'Greatest job in the world'

Aerospace Ops teammates support Army in Iraq on Apache Longbow Crew Trainers

Embedded with a U.S. Army unit in Iraq, Boeing Aerospace Operations' David Hosea and Bruce Lowell both said they have "the greatest job in the world."

As members of an organization that's part of Integrated Defense Systems' Support Systems unit, Hosea and Lowell support the Army customer in Iraq on the AH-64D Apache Longbow Crew Trainer, a high-fidelity simulator used for individual pilot training and, when networked with other simulators, used for multiship-operations training and mission rehearsal. This device helps prepare the U.S. Army for combat.

"We provide the maintenance to support the Longbow Crew Trainer that the unit's instructor pilots use for training," said Hosea, site manager of Apache Longbow Crew Trainers in Iraq. "We give pilots a readiness-level simulator for training, so they're prepared to fly. Maybe someone is new to the unit or hasn't flown in a while. It's critical they're up to speed to go on a mission." Lowell, who serves as site lead, Hosea and their team also provide refresher training to the Army unit's instructor pilots in the on-site simulator in all aspects of the rotorcraft's flight deck instruments and avionics.

"I can't think of another job that requires so many different skills," said Lowell, who joined Boeing in 2002 after serving 21 years in the U.S. Army. "You have to be a software engineer, a computer technician and an electrician. You have to be a jack-of-all-trades."

What's their biggest challenge in the heart of combat? "Our biggest challenge is communications," said Hosea, who joined Boeing eight years ago after serving in the U.S. Army, Army National Guard and U.S. Air Force. "We often have communication blackouts, so the telephone contact and Internet capabilities can be limited."

Hosea and Lowell can't stress enough the rewards of supporting the customer in Iraq.

"I feel like we're helping keep people alive," Lowell said. "It's so rewarding to train pilots in the simulator to where they confidently can do the things they need to do during a mission."

And they can't stress enough how rewarding the job is for them.

"The job is fun, interesting and never boring," Lowell said. "We have a team of great, talented people who are so good at what they do. Boeing really is committed to doing a good job for the military." Added Hosea: "What is most rewarding is when the aviators tell us they appreciate us being here."

—Katherine Sopranos

A U.S. Navy F/A-18E Super Hornet makes an arrested landing aboard the Nimitz-class aircraft carrier USS *Theodore Roosevelt* (CVN 71). Boeing not only builds the F/A-18E/F but also helps support it in the fleet.



U.S. NAVY PHOTO BY PHOTOGRAPHERS MATE 3RD CLASS CHRIS THAMANN

‘Boeing is our first call’

How F/A-18 support team helps the Navy

The F/A-18E/F Integrated Readiness Support Teaming (FIRST) is a logistics program that integrates support elements, such as integrated information systems and supply chain management, to cost-effectively improve fleet support and aircraft readiness for military customers. Under FIRST, Boeing’s responsibilities include providing on-site support at U.S. Navy aircraft bases in California and Virginia and managing equipment manufacturers’ repairs. The program is projected to provide approximately \$1 billion in cost savings over the more than 30-year life cycle of the Super Hornet.

Capt. C. J. Jaynes is F/A-18 deputy program manager—Fleet Support for Naval Air Systems Command. Based in Patuxent River, Md., Jaynes shared with *Boeing Frontiers* why Boeing’s F/A-18 support is important to fulfilling her fleet’s missions.

Q: Is Boeing’s F/A-18 support essential to performing your missions?

A: Without a doubt, we rely on the Hornet Support Centers in the fleet to be the main technical support agency for sailors and aircrew. The in-service support provided from St. Louis is critical to sustaining the fleet as more and more aircraft are fielded. From the inception of the F/A-18E/F support structure, the Navy has invested in Boeing to be the main support for our fleet.

Q: Is Boeing’s performance-based support a more effective way to manage your readiness?

A: I believe so. Through the contract, we are able to share ownership for the readiness requirements with Boeing and work as a team to meet ready-for-tasking goals. Both the Navy and Boeing are tracking to the same

metrics and have the same vision for defining success.

Q: How does access to Boeing’s technical support, training and upgrades improve your business?

A: The improvement is felt by the fleet sites and the fleet support team at Naval Air Depot North Island in San Diego. Technical support and training happens in real time, which makes the team’s jobs much easier and makes everything more efficient. The improvement directly contributes to saving time, which translates into saving resources.

Q: Do you find the on-the-job training elevates the skills and abilities of military personnel responsible for F/A-18 operation?

A: Absolutely. There is so much to be gained by picking up the phone and having the technical expert in your hangar within hours or sometimes minutes. You can read a tech manual all you want, but there are times when hands-on training by the expert provides more value added. I personally witnessed the skill level of my intermediate-level technicians rise after having on-the-job training with Hornet Support Center personnel.

Q: When you face challenges, when do you call on Boeing?

A: Boeing is our first call, and we start out aggressively attacking the problem as a team. There is a true sense of teaming with Boeing. I know they are sincere in their efforts to help the fleet. No matter who from Boeing I have worked with over the last seven years, there has always been a sense of concern and interest in doing what was best for the fleet.

—Katherine Sopranos

To read a Q&A with Terry Kunkel, IDS Support Systems F/A-18 Integrated Logistics director, visit the Boeing Frontiers Web site at www.boeing.com/frontiers

PHOTO COURTESY OF MEDIAWORKS



At Naval Air Station Oceana in Virginia Beach, Va., Boeing F/A-18 East Coast Field Manager Bill Barloon (right) and U.S. Navy personnel meet an F/A-18E/F Super Hornet pilot after flight.

continued from Page 30

are being developed in Phantom Works and IDS Advanced Systems to better perform within our core business offerings and expand into nontraditional markets,” said Rick Martin, IDS Advanced Logistics Support Systems director. “This will take us to the next level of network-enabled capabilities in logistics.”

GROWTH STORY

Since it was formed in 1997, Support Systems has grown into a large organization that drives revenue and business growth. In 2005, IDS Support Systems reported more than \$5.3 billion in revenues, representing 10 percent of Boeing’s total revenues.

“Support Systems’ growth has validated the concept of bringing together all the capabilities needed for post-production support,” said Mark Bass, Support Systems vice president of business development. Bass stressed that Support Systems’ strategies strongly position Boeing to capture more global markets. “We have rigorous strategies to protect and expand our core business, move into serving customers with non-Boeing platforms—such as the C-130 AMP—and move into network-centric operations,” he said.

One segment instrumental to business growth is International Support Systems. Boeing actively works to expand its footprint with U.S. allies to further develop and grow its support services as well as bring Boeing closer to customers. To do this, Boeing makes strategic investments and forms partnerships or joint ventures with local and international aerospace companies.

“Our globalization efforts are principally joint ventures,” said Torbjorn Sjogren, International Support Systems vice president. “We target regions with a Boeing presence, a geopolitical and budgetary climate that makes business sense and where we believe we can bring real value to the table for our partners.”

Investing in local in-country companies, explained Sjogren, is a value-added advantage for Boeing, enabling it to access technologies that improve capabilities and readiness and respond more quickly to customers’ needs. “We create far greater customer confidence by saving costs, having a local work force and having a site where they can see and touch the product,” Sjogren said.

Boeing’s greatest competitive advantage, however, is its people. Support Systems’ Field Services members work around the globe, around the clock—never wavering from their commitment to warfighter readiness or their customers. These product support services provide on-site personnel support at customer locations and tools to

Honor-worthy tasks

An F-15 field service rep talks about his duties

Tim Monoc, a member of Integrated Defense Systems’ Support Systems unit, is an F-15 field service representative for Airframe Systems at Robins Air Force Base, Ga. Monoc explained to *Boeing Frontiers* his responsibilities as a liaison between Boeing and the U.S. Air Force customer.

Q: What support do you provide the customer?

A: Our team performs a variety of duties that include providing technical maintenance instruction and advice to Air Force personnel in the maintenance and operation of F-15A-through-E aircraft and avionics integrated systems. Our job also is to elevate the technical skills and abilities of Air Force military and civilian personnel. We provide formal classroom instruction and on-the-job training on equipment operation, maintenance, troubleshooting and inspection procedures. We also train personnel on the best and safest methods for installations and modifications to the aircraft. In addition, we help develop training plans and provide information for parts acquisition requests.

Q: What’s it like working on an Air Force site?

A: I work on a daily basis with the customer’s programmed depot maintenance technicians, management and the F-15 Systems Program Office engineering group. Basically, depot personnel will come to me for assistance when they encounter problems, have questions about how a certain system works or how a particular component should be installed, or have exhausted their immediate resources.

Q: Why is it so important for Boeing to remain close to the customer?

A: Our customer’s confidence in the performance and quality of our products is crucial, so the relationship between the manufacturer and operator is vitally important.

Q: What challenges do you face?

A: One of the most challenging aspects of my job is we’re working on airframes that are up to 30 years old. The environment they’re exposed to varies, so one aircraft to the next can be very different. All F-15 models cycle through the depot center. During the programmed depot maintenance process, an aircraft is stripped down to its basic airframe. Everything—from wings to avionics to vertical stabilizers—is removed for inspection. Jets that operate in coastal environments tend to have more corrosion damage, and jets that have been used extensively during the war on terror have parts that are wearing out faster than normal.

Q: What is the most rewarding aspect of your job?

A: It’s clear, in the times we are living in, once these jets leave the depot they most likely will be called upon to perform to their maximum potential. The most rewarding part of my job is knowing the support I have provided has added to the success of the programmed depot maintenance process and to the success of our U.S. Air Force customer. It’s both a pleasure and an honor to be a part of a stellar Boeing team that supports the best warfighter aircraft in the world.

—Katherine Sopranos

improve information flow and decision making.

“We’re in a competitive market, but we’re very well positioned in this market with solid strategies to further grow our business,” Finneran said. “Above all, we have a great team of Boeing people. Their selfless dedication to the customer is amazing, and they are why we are a success.” ■

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'A hidden gem'

Structural Repair Facility helps keep F/A-18s flying, models best practices

By LISA DUNBAR

There's a letter on display at the Williams Gateway site in Mesa, Ariz. It's from Lt. Cmdr. Albert Medford of the U.S. Navy, and it reads in part: "Your phenomenal efforts ... directly contributed to the high levels of success the United States achieved ... in the war against terrorism in Operation Enduring Freedom and Operation Iraqi Freedom."

That letter, along with an American flag encased in glass, is a gift to the Structural Repair Facility Team at Williams Gateway. For the past eight years, the Structural Repair Team, part of the Boeing IDS Support Systems group, has created better, faster, and more innovative ways to repair thousands of aircraft components for the U.S. Navy's F/A-18 fleet.

The team has saved the U.S. Navy money, kept a fleet of aircraft vital to the U. S. military in tip-top shape and become known for several of its best practices across Boeing. Since its inception, the center has achieved a 77 percent total reduction in price for the repair of parts for the Navy and repaired more than 4,000 parts.

"The Structural Repair Facility is a hidden gem," said Program Manager Don Leap. "There is not a C- or D-model F/A-18 that doesn't contain a component repaired by the team. We have become the Navy's location of choice for repairing ailerons, trailing edge flaps and horizontal stabilators."

A team of about 40 men and women were hired in 1997 in Arizona to repair components, such as flight controls, trailing edges, flaps, leading edge flaps, horizontal stabilators, outer wing panels, doors and tail hooks. Thirty-six of the 40

Corrosion is a major source of damage to F/A-18 flight controls. Chris Salm, a technician with the Structural Repair Facility, inspects the interior of an F/A-18C/D Trailing Edge Flap undergoing replacement of the inboard hinge.

original hires are still on the team.

"These guys are artisans," said Mac Bolton, manager of the Williams Gateway Facility. "The key to their success is they bring a breadth of experience from both military and commercial airplanes. They help the engineers identify what needs to be done; they define the repair, and then do the repairs."

Among these artisans is Maveya Hayes, who operates a one-employee tail hook overhaul and repair shop. In 1998 when the facility got the program, the Navy had 400 tail hooks on backorder. Within two years, the team was putting them on the shelves; today, there are 300 on the shelves and a steady flow of them coming, she said. "We've also shaved three to five hours off the repair of each, which really adds up," Hayes added.

BEST PRACTICES MODELED

It used to take the Navy depot 270 hours to X-ray individual parts, taking the photos and developing them. With support from Boeing Phantom Works, the Structural Repair Facility has cut the time to eight hours by developing and using a unique, real-time digital X-ray machine. The site has been validated in 2004 as the Navy's program of choice and has cut costs by 80 percent in this critical Non-Destructive Inspection area. The savings came through eliminating film, chemicals and hazardous-material disposal costs. The site has made this process a best practice within Boeing.

"Now we can take a high-resolution image and interpret what needs to be done, save it as a JPG [a common computer-file format for images] and e-mail it, instead of mailing it to Engineering," said X-ray



MIKE GOETTIGS PHOTO

Repairing composite material damage is a core competency of the Structural Repair Facility at the Williams Gateway site in Mesa, Ariz. Mike Clarke, an SRF composite repair technician, is prepping a composite surface area on an F/A-18E/F stabilator to repair damage to this flight control surface.



MIKE GOETTINGS PHOTO

Technician Brent Lee. “The cost and time savings are incredible.”

Parts tracking is another area where the repair facility has set the standards for a best practice. The facility uses tablet PCs—laptop computers that have a screen users can write information on. As employees use the tablet PC to document the status of a component, the information goes directly to a central database. This replaces the tedious process of using paper and spreadsheets, Leap said. Teams from across Boeing are visiting the site to benchmark this process. “Now it’s all done in real time,” Leap said. “I can look [up] a unit on the floor and see what is going on with it. Parts are tracked by serial numbers and we can run sold units, scrap rate and shipping reports.”

The Structural Repair Facility also has successfully piloted and put in use a new bonding and compounding composite process, created by Boeing in St. Louis, to enable the repair of larger contoured parts, such as wings, said Composite Lead John Bourland.

One could say sheet metal expert Bob Mayer is the embodiment of a best practice himself. He has created dozens of tools, shop aids and parts that have saved time, money and simplified the jobs of his teammates. “My job is to make other’s jobs easier,” he said.

One of Mayer’s tools to help repair hinges on the trailing edge flaps has saved 35 hinges so far, said Technical Lead Randy Olson. With hinges costing \$10,000 to replace and only \$3,500 to repair, the

savings is substantial. So far, in the last three years the tool has saved more than \$150,000.

Mayer has also created drilling templates for technicians to mark areas where holes need to be drilled on parts. “It saves hours per part when we can just drill the holes instead of having to lay it all out,” said Aileron Technical Lead John Sanderson.

LEAGUE OF THEIR OWN

There are ample opinions on just what makes the Structural Repair Team so special.

The nine self-directed High Performance Work Teams in the group help resolve issues and promote goodwill, team members said.

“We don’t pay attention to the ‘what ifs.’ We just identify the problems and come up with solutions,” said Sheet Metal Mechanic John Arsenault. “Then we submit the solutions to Engineering and get back to work. We’re not a group to dwell on problems. We keep the flow moving and we’re willing to take new ideas and not say ‘this is how we always did it.’ No one else in the world can do what we do.”

“We have years of experience on this team, which is what makes us unique,” said Bourland. “There is not an aircraft out there that someone in here hasn’t worked on.” ■

lisa.j.dunbar@boeing.com

CALENDAR OF EVENTS

- June 14–15:** 12th Annual Asia Pacific Airline Engineering & Maintenance Conference. Singapore. See www.aviationindustrygroup.com/index.cfm?pg=139
- July 17–23:** Farnborough International Airshow 2006. Farnborough, U.K. See www.farnborough.com
- Aug. 1–3:** 2006 National Aerospace FOD (Foreign Object Damage or Foreign Object Debris) Prevention Conference. Seattle. See www.nafpi.com
- Aug. 29–31:** Unmanned Systems North America 2006. Orlando, Fla. See www.auvsi.org
- Sept. 12–15:** World Airline Entertainment Association 27th Annual Conference & Exhibition. Miami. See www.waea.org/events/conference/2006/indexmain.htm
- Sept. 17–19:** Routes. The World Route Development Forum will conduct its 12th annual conference. Dubai, United Arab Emirates. See www.routesonline.com
- Sept. 18–20:** SpeedNews Seventh Annual Aviation Industry Suppliers Conference. Toulouse, France. See www.speednews.com/Conference/euroconference.html
- Sept. 20–24:** Africa Aerospace and Defence Exhibition. Waterkloof Airbase, South Africa. See www.aadexpo.co.za
- Sept. 20–24:** 2006 Air Carriers Purchasing Conference. San Francisco. See www.acpc.com
- Oct. 3–5:** Boeing Lean Enterprise Conference. Seattle. See http://leo.web.boeing.com/OurJourney/PastEvents/LEC_Fall2006.cfm on the Boeing Web
- Oct. 17–19:** National Business Aviation Association 59th Annual Meeting & Convention. Orlando, Fla. See www.nbaa.org
- Oct. 25–27:** Cargo Facts 2006. Miami Beach, Fla. See www.cargofacts.com
- Nov. 5–7:** SpeedNews 11th Annual Regional & Corporate Aviation Industry Suppliers Conference. Rancho Mirage, Calif. See www.speednews.com/Conference/regionalconference.html
- Nov. 8–9:** 8th Annual Managing Aircraft Interior Costs Conference. Seattle. See www.aviationindustrygroup.com/index.cfm?pg=201

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RETHINKING IT

Airbus reportedly considering redesign of A350

In response to customer feedback and the success of the Boeing 787 Dreamliner, Airbus is working on another redesign of its forthcoming A350 mid-size passenger airplane, news reports said.

According to the magazine *Flight International*, three versions of the redesigned A350 are expected. Each is intended to compete against Boeing models:

- The A350-800, which will carry about 250 passengers, is aimed at the 787-3, -8 and -9.

- The A350-900, with about 300 seats, is pitted against the 777-200ER and potential 787-10.

- The A350-1000, with seating for around 350, is intended to compete against the 777-300ER.

Although the current iteration of the A350 is based on the A330-200, a redesigned A350 would be an all-new airplane, news reports said.

Compared to the most recent A350 version, the redesigned A350 will offer a wider fuselage cross-section, a larger all-composite wing, a higher cruise speed of Mach 0.85 and more powerful engines, *Flight International* said. The cost for developing an all-

new A350 would be about 8 billion euros (\$10 billion), news reports said.

According to the Bloomberg news service, a redesigned A350 would first become available in 2012. That's two years later than current A350 plans call for and four years after the 787's scheduled entry into service.

An Airbus spokesman told the *Financial Times* the company "is listening to customers, studying the options and will decide [on possible changes to the A350] by midyear. No decision has yet been made." Various reports indicated an official announcement could come during July's Farnborough International Airshow in the United Kingdom.

So far, Airbus has booked about 100 A350 orders. Meanwhile, Boeing has booked 393 orders and commitments from 29 customers for the super-efficient, advanced-technology 787.

Boeing representatives appeared unfazed by talk about a redesigned A350.

"From the beginning of the 787 program we fully anticipated that [Airbus] would have a viable competitor," said Mike Bair, vice president and general manager of the 787 program for Boeing, in the Bloomberg report. "It'll be interesting to see what they do." ■



Here's an artist's depiction of the Airbus A350 jetliner's flight deck. According to news reports, Airbus is considering redesigning the A350 in response to customer comments and the sales success of the Boeing 787 Dreamliner airplane.

AIRBUS GRAPHIC

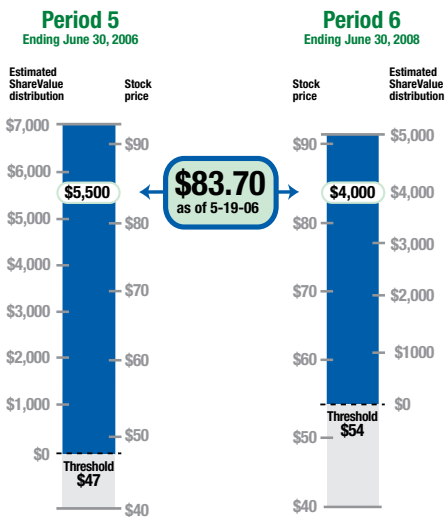
Boeing stock, ShareValue Trust performance

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

The program—which runs for 14 years and ends in 2010—features seven overlapping investment periods. Each period lasts four years (except Period 1, which expired in 1998 and covered two years). The program is currently in Periods 5 and 6.

For each fund period, the value of the trust that exceeds 3 percent annual growth is distributed to eligible participants in the form of stock (with partial shares in cash). Participants on non-U.S. payrolls will receive cash in lieu of stock. The trust investment value can grow in two ways: when the market value of Boeing stock increases over the long term, and when shares are added to the trust because dividends have been reinvested.

The estimated Period 5 and Period 6 share price thresholds are \$47 and \$54 respectively.



The two graphs show estimates of what a “full 4-year participant” ShareValue Trust distribution (pretax) would be for Periods 5 and 6 if the end-of-period average share prices were the same as the recent price shown.

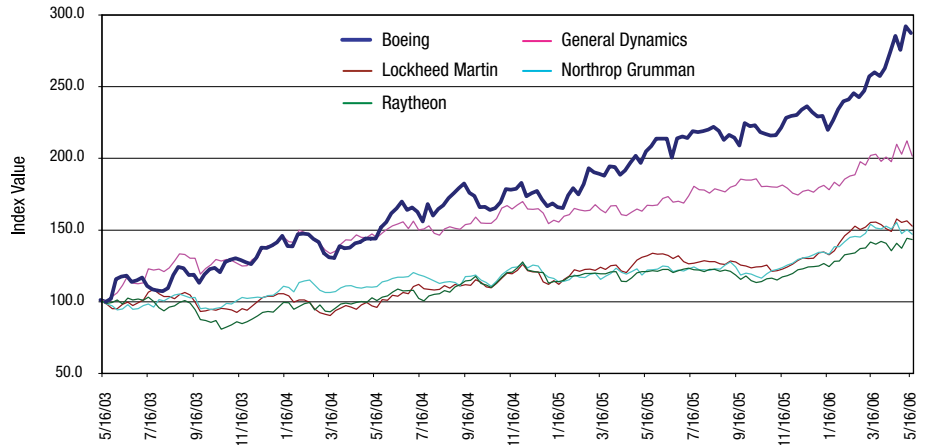
- Distributions are prorated based on the number of months an individual is eligible.
- The share price shown is the average of the day's high and low New York Stock Exchange prices.

In preparation for the end of Period 5, payout estimates have been updated and rounded to the nearest \$500 to reflect current participant/employment data. Updates to this data will be made periodically.

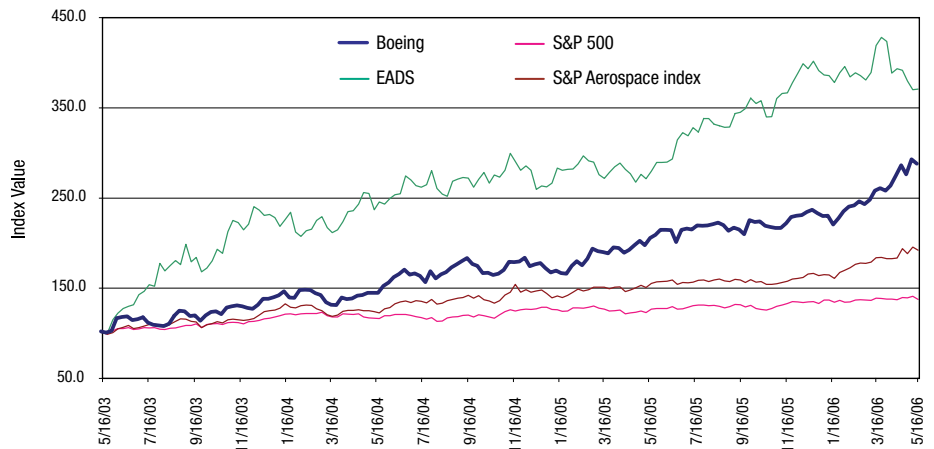
STOCK WATCH

The chart below shows the stock price of Boeing compared to other aerospace companies, the S&P 500 index and the S&P 500 Aerospace and Defense index. Prices/values are plotted as an index number. The base date for these prices/values is May 16, 2003, which generates three years of data. The prices/values on that date equal 100. In other words, an index of 120 represents a 20 percent improvement over the price/value on the base date. Each data point represents the end of a trading week.

Boeing vs. U.S.-based competitors (3-year)



Boeing vs. stock indexes and foreign competitors (3-year)



Comparisons:

4-week, 52-week	Price/value as of 5/12/06	Four-week comparison		52-week comparison	
		Price/value as of 4/14/06	Percent change	Price/value as of 5/13/05	Percent change
BOEING	87.01	82.93	4.9%	59.50	46.2%
U.S. COMPETITORS					
General Dynamics	65.20	63.89	2.1%	52.72	23.7%
Lockheed Martin	74.62	72.83	2.5%	64.02	16.6%
Northrop Grumman	66.67	68.33	-2.4%	53.75	24.0%
Raytheon	46.26	43.69	5.9%	39.01	18.6%
FOREIGN COMPETITORS					
EADS *	30.42	32.28	-5.8%	22.24	36.8%
U.S. STOCK INDEXES					
S&P 500	1291.24	1289.12	0.2%	1154.05	11.9%
S&P 500 Aerospace and Defense Index	356.93	341.18	4.6%	279.98	27.5%

* Price in Euros

SERVICE AWARDS:

Boeing recognizes the following employees in June for their years of service

55 Years

Charles Tapper

50 Years

Ronald Kawai
Keith Mackie
Patricia Marshall
Andrew Peterson

45 Years

John Adamski
Glen Borman
Robert Dahlquist
Walter Holten
Willie Jackson
Lawrence Mattausch
Russell Meador
Beverly Pauley
Charles Ramer
Richard Schrieber
Clark Sechler
Johnny Smart
James Stewart
Michael West
John Zabilowicz

40 Years

Dan Anglim
George Anglin
Wayne Asselmeier
Charles Bengry
Marva Bernsen
Cary Black
Clete Boldrin
David Breihahn
Jack Brown
William Budner
William Bunce
William Carver
Richard Clegg
Thomas Coriell
Michael Creech
Lee Crisler
Robert Cunningham
George Dececco
Brian Dickerson
Terry Donaldson
Charles Doughty
Bruce Dumont
Richard Fitch
Henry Flauaus
Martin Fuchs
Gary Fujita
Wayne Gallion
William Getz
Danny Ginder
Don Goldacker
William Goodman
Kathleen Greenlee
Leo Gustafson
Marvin Hacker
Ronald Hacker
Robert Hamilton
Jon Harrington
James Hemming
Ronald Hess
Jon Hildrum
Charles Hinson
Michael Hoban
Gary Holtkamp

Howard Hughes
Robert Jetensky
Robert Johnson
David Kassens
Arthur Klasing
Richard Knowlton
Nicholas Kokotovich
Nicholas Kuntz
Harry Larsen
Kenneth Lippincott
Roger Lower
Harry Magill
Jan McDonald
James McLaughlin
Ronald Mehs
David Meldrum
Travis Nelson
David Nielson
Joseph O'Connell
James Phillips
Edward Przygoda
James Reed
Susan Reitz
Steven Reno
William Rietkerk
Dave Rilling
Terrell Scheve
Larry Scott
Lawrence Segelken
Tarjison Seibert
Kenneth Shaw
Theodore Shumpert
Ronald Simpson
Richard Smith
Howard Snyder
Willie Stanley
Larry Stuart
Thomas Talley
Steven Taylor
Earl Tennon
Donald Thole
Jerome Torrey
Cuthbert Turner
Edward Vahle
Robert Vogtmann
Thomas Volz
Dale Wagner
Timm Waibel
Hoyt Wallace
Ronald Walters
John Weaver
Francis Wentz
John White
Leslie Willis
Rodney Wisor
Robert Woodling
Dallas Worrell
Floyd Worthen

35 Years

Michael Adams
Alvin Anderson
Jack Biles
Tory Colvin
Thomas Crandall
Gary Cross
Norman Dauderman
Ruth Dawson
Anthony Dill
Clifton Ehlen

James Fernen
Robert Fisher
Scott Fleming
Wallace Green
Sandra Hagadorn
Raymond Hernandez
Lee Hickman
Ollie Hill
Brenda Jackson
Lawrence Kauffman
Yoshiaki Kawamoto
Edward Klein
Terrence Knutzen
Jean Krissman
Richard Lentz
Kevin Longwell
Norberta Malicay
Jennifer Martinez
Ronald McKee
Michael Miller
James Morris
Richard Nelson
Spellman Olivier
Dana Podgajny
Delbert Potts
William Rickert
William Roenicke
Charles Saff
Salvador Sanchez
Joseph Stone
Dyna Szymanski
Bobbie Vercher
Leonard Wright
Karen Young

30 Years

Jose Afleje
Glenn Anderson
Betty Applegate
Fezell Ard
James Ardolino
Joseph Bartashy
Philip Bear
Terry Becker
Janice Beckman
David Bernhardt
James Boyd
Gary Brewer
Debbie Carr
Carl Carrera
Victor Castioni
Thomas Cavedine
Don Childers
Richard Coleman
Carolyn Collins
Thomas Collinvitti
Thomas Cooper
William Cribb
Philip Danenbauer
Thomas Dankovich
Merle Deal
William Deibert
Dale Donald
Allen Etheridge
Stephen Feller
Harold Fitzgerald
Ray Fontaine
Ivory Franklin
Michael Gauthier
Catherine Gauthier-Godsey

Alan Gellis
Dwight Glidewell
Rachel Gomes
Gerald Gordon
Robert Goudie
Paul Grimard
Michael Guntly
Edward Haag
Kenneth Hammons
Gabriel Hanzeli
Thomas Hartwell
Ernestine Hawthorne
James Higgins
Ronald Hilton
Joanne Hinkle
Sandra Hobold
David Hoeman
Robert Holliday
Edward Hollis
Parl Hummel
Charles Illi
Richard Ingram
Reed Itschner
Derek Iverson
Theotric Jackson
John Kaulukukui
Thomas Kihlken
Brooks Kimbrough
Wendy King
Steven Kitsch
Gregory Kurdzos
Sharon Lamm
Curtis Larson
Neil Lee
Robert Librizzi
Kay Little
Joseph Marini
Bruce Marschall
Jan Mathieson
Dennis Matsumoto
John Matthew
Robert Mattingly
Christine McKinney
Rosemary McLaughlin
Alice Miller
Ronnie Milligan
Michael Mlynarczyk
Philip Moore
Ronald Moore
Thomas Moore
David Morrison
Paul Nelson
Kathryn O'Connor
Timothy Ohrke
Christopher Olson
Marley Pacpaco
Donald Paller
Charles Perkins
Ping Pfeffer
Claudia Pieper
William Plath
Dale Rhotehamel
Mary Riede
Sandra Rivera
Jenny Romo
Scott Sanders
Edward Schlipf
Robert Schlue
Randy Schmidt
Frederic Scholter

Margaret Shankland
Gregory Slate
Robert Stacey
Glenn Tillitt
Paul Toth
Robert Trn
Acel Troutman
Gary Turner
Dennis Tynan
Gerard Van De Ven
Jeffrey Verwey
Frederick Vorwerk
Kenneth Walck
William Waldron
William Westbrook
Edward White
Wesley Will
Peter Williams
Steven Williams
Kathleen Willis
Theodore Wills
Kenneth Wilson
Don Winter
Scott Yaeger
Roger Young
Allan Zook
Daniel Zust

25 Years

Gregg Abenroth
Albert Abraham
Randal Ackerson
Michael Adams
Morris Adams
Daron Ahaitty
William Ahl
James Alstad
Douglas Anders
Derek Anderson
Jacqueline Anderson
Pamela Anke
Michael Arnold
Scott Arnold
Daryle Arthalony
Joy Arview
Thomas Asaif
Cole Auckland
James Babb
Louis Bacco
Chris Bada
Judy Ball
Ronald Ball
Jung-Nye Bang
Virginia Barnes
Gregory Bateman
Bruce Beardwood
George Beck
Nathan Beck
Daniel Becker
Kenneth Becker
Jennifer Benedict
Gregory Berg
David Berryhill
Gerald Betzer
Linda Beyerlin
Thomas Bigford
David Binder
Robert Birch
Wayne Bishop
Clifford Blanton
James Bloom
Sharyn Bonja
Mori Borumand

Nanette Bouchard
Edward Bracy
Richard Brewer
Michael Brickman
Ronald Browner
Clifford Brown
Janiece Browne
Gregory Bruce
Betty Bryant
Mark Buchholtz
Amy Buhrig
David Buis
Larry Bull
Michael Burns
Riley Bushman
Wanda Butler
Mark Butski
Eliseo Cabanban
Michael Calandro
Alice Caldera
Kent Campbell
John Carr
Michael Carson
Alan Cassidy
Alvan Castello
Mary Castillo
Patrick Chambers
Paul Chancellor
George Chandler
Oliver Chapman
Timothy Chapman
Brian Chopp
Wayne Christian
Emerson Clark
William Clark
Bruce Clessa
Michael Cody
Patricia Coleman
John Collum
Jodi Cook
Nancy Cook
Willis Cook
Russell Cooper
Michael Corona
Joyce Cosey
John Costanza
Angela Crater
Jeffrey Croft
Jennifer Crowell
Albert Curry
Jeffrey Czuchna
Linda Dacko
Kathleen Dahl
Douglas David
Donald Davidson
Richard Davies
Thomas Davis
Walter Davis
Christine De Leon
Patrick Decker
Michael Dehner
Suzanne Derryberry
Manuel Diaz
Consola Dill
Kent Doane
Kenneth Dokken
Louis Dorazio
Debra Dorze
Stephen Doyle
Kenneth Dunkelberg
Marilyn Dunlap
Donald Dupree
Richard Durkopp

William Duszynski	Cathy Haskins	David Kelly	David Micka	Richard Roser	Mark Trent
Dennis Dvorachek	Susan Haskins	Timothy Kelsheimer	Joseph Mode	John Russell	Barney Tsang
Randy Eaton	Timothy Haverluk	Donna Kempf	Joseph Moehrle	Richard Saadeh	David Tse
Brent Edinger	Michael Hayes	Paul Kikta	Michael Mohrmann	Eric Saari	Joseph Turner
Earnestine Edwards	Milton Head	David King	Richard Moloney	Keith Sabala	Lucinda Varnedoe
James Eiselstein	Peggy Heady	Margaret King	Kyra Monaco	Craig Saddler	Steve Venitsky
Richard Eklund	Daniel Heath	James Kirks	Bradley Mongeau	Franklyn Sanchez	Vincent Ventin
Eugene Ellis	Brian Helligs	Russell Klise	Jack Moore	Francisco Sandoval	Liem Vu
Steven Elrod	Fredrik Hernandez	Peter Kobory	Michael Moore	Deane Sauve	Denise Wagner
John Emerson	Gonzalo Hernandez	John Koch	Jerry Mosely	Lyal Schlotterbeck	Rex Walter
Curtis Engelbrecht	Guadalupe Hernandez	Dean Kohrs	Olivia Motland	Carl Seavers	Wayne Wardell
Cindy England	Ray Hervey	Steven Kornmeyer	Robert Neff	Eric Selby	Henry Warner
Gary Enochs	Christopher Hibler	Walter Kowalczyk	Tiep Nguyen	Ronald Shaffer	Rose Wash
Stacy Etsinger	Ricky Hill	Randal Kram	Eric Nicol	Richard Shannon	Shelby Washington
Robert Evans	Donald Hillis	George Krieg	Phillip Noel	Terence Shollar	John Watkins
Denise Fears	Douglas Hinkson	Bruce Krueger	Gary Nordman	Gary Sievers	William Waugh
Terry Finley	Chun-Sing Ho	Stephen Lambert	Catherine Ochsner	Jay Singh	Patricia Weiss
Todd Fisher	Debra Hoff	Mark Landwehr	Richard Ogden	Terry Slama	Karen Wendling
Dennis Fleischman	Richard Hoffman	Neal Larsen	Martin Ohman	Ronald Sluyter	Randy White
Charles Flores	Dennis Holdener	Jeffrey Larson	Mark Orsen	Georges Smaha	Charles Whitman
Diana Flores	Jeffrey Horton	Thomas Lawrence	Alma Ortiz	Ronald Small	Jeffery Whitney
Richard Fox	Richard Horton	Jacques Le Veaux	Marsha Ott	Charles Smith	Pamela Whitted
Gerald Frahm	Bruce Howard	Paul Leander	Dennis Ousley	Mitchell Smith	John Wick
Kay Francis	Donna Howdeshell	Hongwook Lee	Myung Paiji	Patrick Smith	Barbara Wiese
Ronald Froman	Kevin Howdeshell	James Lee	John Palmser	Ross Smith	James Wilcox
William Fuentes	Michael Howell	Po-Yi Lee	Gerald Park	Barry Snyder	Ricky Willard
James Gallagher	James Hoxie	Thomas Lervik	Gilbert Perales	Theresa Sontheimer	Albert Williams
Freny Gandhi	John Hubbs	Richard Levesque	William Phegley	William Sowell	Dennis Williams
Charles Gangitano	Candice Huber	Scott Lewis	Michael Piel	Allan Spousta	Dorothy Williams
Lorenzo Garay	Jacob Huether	Sharon Liddy	Steve Polin	Robert St. George	Kenneth Williams
Donald Gardner	Stuart Hughes	Gary Lippig	Alan Pomeroy	Timothy Stapelman	Natalie Williams
Carla Garrett-Bailey	David Huie	David Lush	Linda Pool	Robert Steele	Pamela Williams
Jimmy Gehrke	Patricia Hull	Alfred Mager	John Porter	John Steer	Jeffrey Wilson
Joe George	Jerome Hulm	Kenneth Magill	Charles Prather	Stacey Stock	Scott Wilson
Nahed Georgie	Bernard Hulscher	Rocky Malme	Craig Prickett	Ronald Stojack	Kimberly Winter
Linda Geringer	Donald Hulse	Marlene Marabut	Larry Proctor	Zoanne Stokke	Brian Wismer
Bradlee Gibbs	Neal Huynh	Gina Maragno	Keith Prukop	Sandra Stoy	Timothy Wismer
Vickie Gibbs	Scott Hytrek	Gary Mark	Annie Purnell	Trudy Striegel	Timothy Witthauer
David Gilleland	Forrest Irwin	Tracy Marks	Brian Purves	Steven Strouse	Andrzej Wojciechowski
Timothy Gomes	Gregory Ives	Bobby Marsh	Gordon Quehrn	Kevin Stuart	Joanne Wolff-Howell
James Goodwin	Dana Jensen	Thomas Martinsen	Carmella Raffa	Robert Studerus	Jo Wood
Steven Gordon	Dennis Jett	Judy Mashore	Freddie Ramirez	Robert Sullivan	Felicia Woodson
Patrick Green	Ruben Jimenez	Richard Massey	Lawrence Rathke	Steven Swaringen	Ivan Workman
Dane Grgas	David Johnsen	Allyn Mateu	Ralston Read	Margaret Taboada	Stephen Wright
Therese Griffin	Aletha Johnson	Melissa Mattmuller	Bryan Reamer	Ann Tayenaka	Steven Yahata
Mark Grimes	Donald Johnson	Dana McAvoy	Dennis Reidenbach	Fred Tefft	Paul Youman
Bobby Gross	Kent Johnson	John McGarvey	Richard Richardson	Mary Tejada	Eric Zimmerman
Thomas Guenther	Randy Johnson	William McKee	Alvin Rion	William Thode	Cheryl Zozaya
Gerald Gutierrez	Robert Johnson	Craig McKelvey	Cecelia Rivera	Lowell Thomas	
Ernest Gylland	Scott Johnson	James McKenzie	Carl Robb	Jon Thompson	
Dean Habowski	Shannon Johnson	George McLaughlin	Richard Roberti	Peter Thompson	
Brenda Hale	Mitchell Johnston	Barry Meaker	Gerald Robinson	Vincent Thompson	
Lynn Hallstrom	Marvin Jones	Jane Meeley	Anthony Robles	Yvonne Thompson	
Larry Hancock	Michael Jones	Rory Melton	Gene Rogers	Randy Tinseth	
Iyvind Hansen	Douglas Kaminski	Rosalind Merrow	Keith Rogers	Paul Tipton	
Leonard Hardaway	Robert Kasper	Edward Meyer	Eddie Romo	Norma Tokushige	
Gregory Hardy	John Kelley	Gregory Meyer	Dean Rosencrantz	Gail Tominaga	

RETIREMENTS:

The following employees retired in April from The Boeing Company.

Shaun Abbott, 33 Years	Donald Barnett, 9 Years	David Blaser, 21 Years	Dennis Burke, 8 Years	Norman Collins, 27 Years
Kathleen Adams, 28 Years	Donald Bass, 27 Years	James Bonello, 42 Years	Dominick Cacciatore, 21 Years	Charles Conley, 42 Years
Michael Adams, 24 Years	John Becker, 31 Years	Sammy Bonner, 7 Years	Wilma Cardwell, 19 Years	Gerald Conway, 16 Years
Gary Albee, 40 Years	James Becktold, 28 Years	Ralph Bortnem, 33 Years	Donald Cargille, 37 Years	Robert Cooper, 27 Years
Christopher Allen, 25 Years	Larry Bendt, 41 Years	Yuju Boulden, 23 Years	Robert Carlson, 41 Years	David Copeland, 34 Years
Andrew Antal, 10 Years	Betty Biggerstaff, 24 Years	Catherine Brinn, 21 Years	Jesus Casanova, 37 Years	James Cox, 30 Years
William Ashlock, 19 Years	Lee Biggs, 20 Years	William Brown, 44 Years	James Casserly, 39 Years	Thomas Craig, 27 Years
John Auditore, 35 Years	Walter Black, 27 Years	Richard Brunson, 8 Years	John Christensen, 26 Years	Clark Creery, 16 Years
Lester Bailey, 25 Years	Clyde Blake, 27 Years	Joel Burdsall, 22 Years	Joan Clark, 31 Years	Bernardo Cuengco, 27 Years
			Jerome Cohen, 29 Years	John Curran, 36 Years
			Teresa Colgan, 26 Years	Betty Dameron, 5 Years
			Lewis Collins, 39 Years	John Dance, 17 Years

■ MILESTONES

Danny Daniels, 9 Years
Eileen Daniels, 29 Years
Marvin Daun, 33 Years
Billy Davis, 27 Years
Lexine Davis, 24 Years
Alan Dawson, 37 Years
Roy Debellis, 44 Years
Thomas Dechant, 20 Years
Nancy Deming, 23 Years
Darrell Dennell, 37 Years
Patrick Diederichs, 3 Years
James Diehl, 3 Years
Thomas Eales, 8 Years
Alvin Eisenbraun, 36 Years
Margaret Ellerbrook, 20 Years
Kathy Engelkes, 21 Years
Fred Estoque, 26 Years
Daniel Eugenio, 20 Years
Clarice Felter, 17 Years
George Fernandez, 38 Years
Joseph Flanagan, 15 Years
Frank Focht, 13 Years
Grace Foote, 5 Years
Dennis Ford, 39 Years
Florence Ford, 49 Years
Francis Ford, 35 Years
John Funke, 38 Years
Richard Garcia, 27 Years
Douglas Garman, 17 Years
Richard Gehle, 37 Years
Gary Gell, 24 Years
Eric Geyer, 30 Years
Charles Gilpin, 43 Years
Norman Gipe, 28 Years
John Giroux, 16 Years
Ramon Gonzales, 32 Years
Austria Gonzalez-Bevil,
14 Years
Kenneth Gray, 32 Years
Daniel Grosnick, 37 Years
George Haglund, 37 Years
Carol Hainline, 25 Years
Stephen Hammil, 16 Years

Leroy Hampleman, 42 Years
Jerry Hart, 35 Years
Laurence Hata, 26 Years
Ardith Haworth, 10 Years
Dennis Heieren, 26 Years
Barbara Henry, 29 Years
Ronald Henson, 37 Years
Mark Hillman, 24 Years
Don Hochheiser, 21 Years
Thomas Hoefling, 5 Years
Georgette Hogan, 17 Years
Kenneth Holzum, 21 Years
Sandra Houser, 34 Years
Benedict Huber, 14 Years
James Hughes, 26 Years
Robert Huss, 46 Years
Michael Hutton, 35 Years
Dwight Imanaka, 30 Years
Patricia Jackson, 20 Years
Elizabeth Jacobsen, 7 Years
Robert Jacobson, 17 Years
William Janning, 26 Years
Thomas Jasper, 37 Years
Deborah Jones, 19 Years
Virginia Jones, 21 Years
Robert Kallam, 38 Years
Pamela Kelley, 23 Years
Harold Kelly, 16 Years
Gwendolyn Kemper, 16 Years
Thomas Kennedy, 38 Years
Travis Kidd, 19 Years
Judith Kies, 23 Years
Robert Kies, 18 Years
Susan Kingsbury Newman,
25 Years
Dewey Knight, 18 Years
Richard Knudson, 16 Years
Ram Kochhar, 21 Years
Carl Kolander, 23 Years
Terence Kriha, 33 Years
Lester Kuykendall, 23 Years
Elsie Lajeret, 27 Years
Martin Larson, 35 Years

Robert Leckenby, 21 Years
Robert Levack, 33 Years
Jenn Liang, 15 Years
Douglas Lieberg, 32 Years
Brenda Lindsay, 21 Years
Gerald Little, 32 Years
Ethel Long, 19 Years
Jean Lorch, 39 Years
Gary Luce, 32 Years
Lucio Luna, 36 Years
Ronald Lundstead, 14 Years
Thomas Lundstrom, 18 Years
Barbara Mage, 26 Years
Ronald Malcolm, 20 Years
Merlita Manalo, 17 Years
John Martin, 34 Years
Terri Martin, 20 Years
Thomas Martincic, 9 Years
David Matulka, 27 Years
Wayne McCarty, 32 Years
Larry McCune, 27 Years
Carol McEwen, 18 Years
Marlene McGrath, 8 Years
Dick Mead, 25 Years
Donald Meakin, 22 Years
Curtis Melvin, 35 Years
David Mercado, 36 Years
Michael Merwin, 27 Years
James Metoyer, 38 Years
Nelly Meza, 24 Years
Thomas Michalek, 37 Years
Robert Miller, 32 Years
Frank Minter, 37 Years
Wayne Mitton, 37 Years
Samuel Mobley, 8 Years
Baltazar Moreno, 34 Years
Paul Morrell, 19 Years
Richard Murlless, 16 Years
Terence Murphy, 27 Years
Francis Naus, 20 Years
Linda Newell, 25 Years
Diane Noahr, 27 Years
Linda Nuanez, 22 Years

Timothy O'Hearn, 33 Years
Dianna O'Rourke, 23 Years
Judith Packer, 41 Years
Edgar Padillo, 26 Years
Raymond Pakul, 14 Years
James Parent, 31 Years
David Pearlman, 45 Years
Jerry Pearson, 7 Years
George Penic, 30 Years
William Perdreaux, 19 Years
Michael Perrault, 37 Years
Gary Petko, 20 Years
Sherryl Pfaff, 27 Years
Kenneth Ponder, 17 Years
Helen Portis, 27 Years
Andrew Pozsar, 14 Years
David Pressler, 9 Years
Lee Ray, 35 Years
Dean Rebeck, 38 Years
Francis Reeve, 23 Years
Peter Richard, 8 Years
Richard Riegel, 22 Years
Stanley Rigdon, 42 Years
Dick Riley, 37 Years
James Ritchey, 3 Years
Clifford Robbins, 40 Years
Ollie Roberts, 5 Years
Paul Roberts, 33 Years
Leila Robinson, 41 Years
Gary Rogers, 31 Years
Donald Rose, 35 Years
Dennis Sackman, 8 Years
Charles Sacksteder, 42 Years
George Sarkis, 19 Years
William Saylor, 26 Years
Lonnie Schmidt, 32 Years
Sharon Schuldt, 24 Years
Clayton Shaber, 51 Years
Robert Shannon, 36 Years
James Shaw, 26 Years
Douglas Skelton, 29 Years
Francine Smith, 9 Years
Janet Smith, 33 Years

Joann Smith, 25 Years
Mary-Ellen Smith, 30 Years
Geoffrey Snow, 27 Years
Edward Speicher, 36 Years
Lawrence Spires, 28 Years
Weldon Stanford, 21 Years
Edward Stevey, 13 Years
Joseph Stewart, 20 Years
Brian Stillings, 28 Years
Kerry Strand, 33 Years
Linda Sundblad, 28 Years
Donald Supernaw, 32 Years
Janis Sweeney, 26 Years
James Tellvik, 26 Years
Peggy Thies, 26 Years
James Thompson, 22 Years
James Thompson, 25 Years
James Tierney, 5 Years
Dwight Tolley, 16 Years
James Vermillion, 21 Years
Marvin Vincent, 42 Years
Regis Voyson, 31 Years
Everett Walter, 28 Years
Robert Wedel, 30 Years
Clifford Weisman, 16 Years
Russell Wenk, 14 Years
Gary Whipp, 25 Years
Joe White, 21 Years
Charles Whittington, 30 Years
Brian Williams, 20 Years
Marvin Williams, 33 Years
Dennis Williams, 25 Years
Douglas Wise, 28 Years
Chuck Wong, 26 Years
Thomas Woods, 42 Years
Milton Woodridge, 24 Years
Bruce Wylie, 43 Years
Marilyn Wylie, 22 Years
Gail Yaross, 15 Years
Joseph Yaross, 16 Years

IN MEMORIAM

The Boeing Company offers condolences to the families and friends of the following employees, whose deaths recently have been reported.

William Anderson, quality systems manager; service date July 8, 1965; died May 17.

Danny Baird, aircraft and engine electrician and mechanic; service date March 1, 1978; died May 10.

Mark Eales, sheet metal assembler; service date Nov. 26, 1989; died May 14.

Rebecca Edwards, computing process specialist; service date Dec. 14, 1998; died April 29.

Nancy Eng, mechanic; service date June 3, 1988; died April 27.

Victor Fitz, manufacturing planner; service date Jan. 3, 1989; died April 18.

Charles Gindhart, program analyst; service date March 30, 1998; died April 16.

Larry Hawthorne, engineer/scientist; service date Oct. 5, 1998; died May 7.

Patrick Kneuer, manager; service date April 2, 1985; died May 11.

Kathy Lynch, aircraft press and vacuum tester; service date April 14, 1987; died April 12.

Mark Madden, mechanic; service date Aug. 17, 1987; died April 30.

Taalib-Din Mahdi, Global Diversity employee rights specialist; service date Aug. 15, 1990; died May 4.

Penelope Morick, staff analyst; service date Sept. 8, 1986; died May 7.

Kimberly Moroney, security officer; service date Aug. 10, 2000; died April 23.

Robert Neyers, delivery systems generalist; service date Aug. 28, 1991; died April 29.

Richard Parrish, business and planning analyst manager; service date March 16, 1992; died April 26.

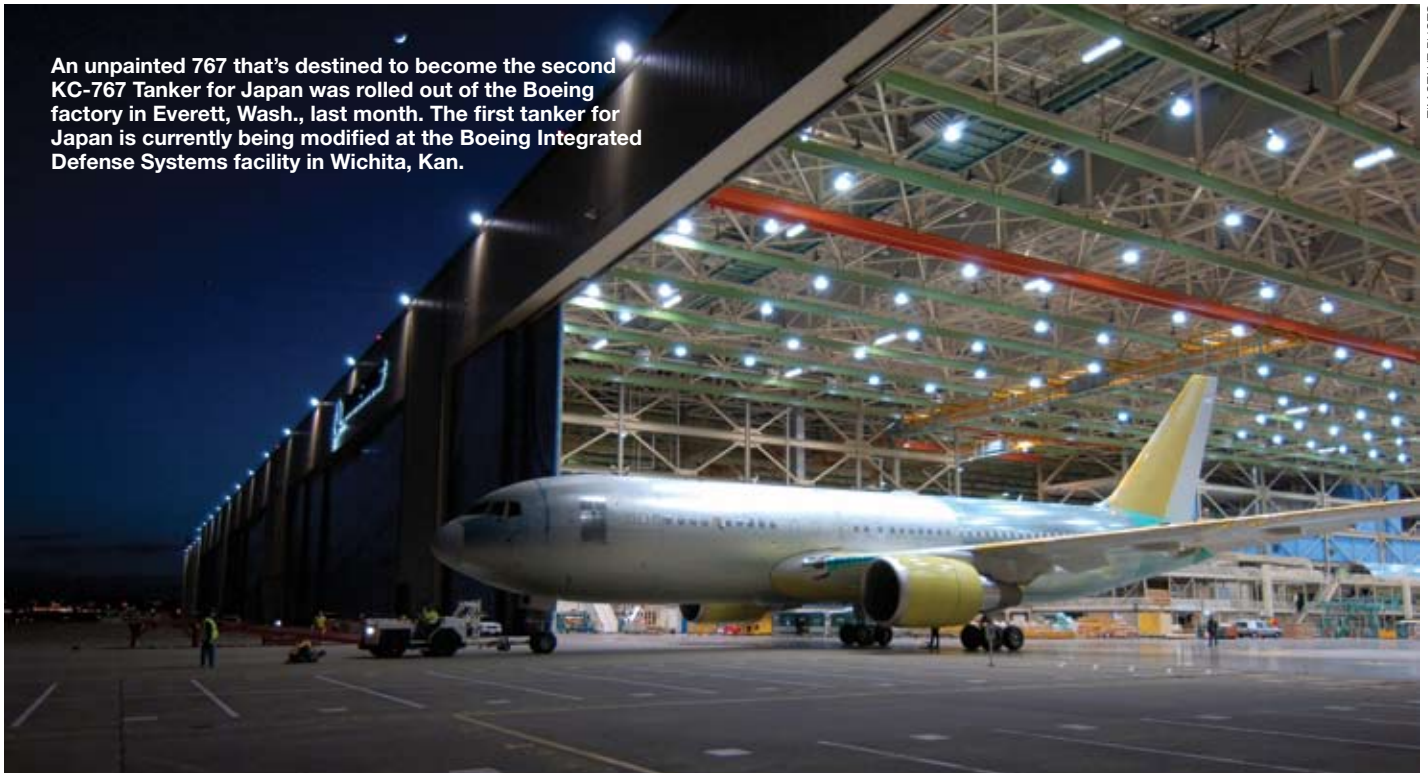
John Pawlowski, tank test and repair mechanic; service date March 29, 1990; died May 6.

Trudy Russell, computing process specialist; service date Feb. 8, 1988; died April 24.

Wilfred Pearce, engineer/scientist; service date Nov. 3, 1965; died May 15.

Patricia Young, manager; service date Oct. 25, 1982; died May 7.

An unpainted 767 that's destined to become the second KC-767 Tanker for Japan was rolled out of the Boeing factory in Everett, Wash., last month. The first tanker for Japan is currently being modified at the Boeing Integrated Defense Systems facility in Wichita, Kan.



TIM STAKE PHOTO

AROUND BOEING

SECOND 767 FOR JAPAN TANKER PROGRAM ROLLS OUT

The 767 destined to become the second KC-767 Tanker for Japan rolled out of the Boeing factory in Everett, Wash., in late April. After being painted and undergoing final functional testing and flight test, the airplane will begin an extensive modification program that will transform it into an aerial refueling tanker.

“As each milestone is accomplished, we know we are another step closer to having the KC-767 Tankers in service,” said Maj. Kenji Nagatomo, liaison officer for the Japan Air Self-Defense Force.

The first tanker for Japan will be delivered later this year.

BBJ ADDS 6 NEW ORDERS, CONSIDERS NEW VERSION

The Boeing Business Jets program last month said it won six new orders, increasing total program sales to 108 airplanes.

According to the BBJ program, the new orders came from regions around the globe including Southeast Asia and Europe. Most customers of BBJ models, which are derivatives of Next-Generation 737-700 and 737-800 airplanes, choose to remain anonymous, which is typical in these types of private business dealings.

“The continued sales momentum of the BBJ reflects the value customers place on the airplane’s range capability, its industry-leading reliability and its spacious cabin,” said BBJ President Steven Hill.

Hill also said the program is considering the development of a convertible cargo airplane based on the commercial Next-Generation 737-700C (Convertible). This version would allow operators to alternate between passenger and cargo layouts. The decision to explore the possible new BBJ family member is based on a firm order from a BBJ customer for a 737-700C. Hill

said a decision to offer the new version could be made before the end of the year.

BOEING PRINTER INTEGRATION PROGRAM LAUNCHES

The Boeing team responsible for more than 31,000 network printers has launched a companywide printer integration program to provide better and more consistent service and support for networked printers.

During June, the team members will fan out to make a physical inventory of all the imaging devices at larger Boeing sites in the United States. The changes directly align with the Boeing companywide growth and productivity initiatives.

“We’re applying Lean service principles to this huge network of devices,” said Earl Beauvais, director of Print, Plot and Scan, the Shared Services Group organization that’s responsible for Boeing’s network printers. “It will let us manage all these resources as one integrated network, resulting in better overall performance.”

Beauvais said the transition may be subtle at first. While many people will not notice an immediate change, Beauvais said he believes most people will soon begin seeing benefits to the way their printers are serviced. “And as the plan is fully implemented,” Beauvais added, “they will see new options to streamline printing work flow in their offices and shops.”

“There is also significant savings when we focus on the total cost of ownership of the printers and bundle the many existing contracts into one,” said Jim Wigfall, SSG vice president of Supplier Management. “This is the type of innovative breakthrough the company is encouraging through the companywide initiatives.” ■



MARIAN LOCKHART PHOTO

The Flammability Assurance Process Change Team

Our team goal is lower cost—while continuing to meet safety requirements. U.S. Federal Aviation Administration regulations mandate that airplanes be made from fire-resistant materials—including those carrying electric current. To guarantee flammability compliance, Boeing has been burn testing every new electronic assembly it introduces on its planes—trial by fire in a lab.

This has included a lot of new-model printed wiring circuit boards and printed wiring assemblies—plus many additional printed wiring boards and assemblies installed with each electronic upgrade of the airplane. Even though many of these new circuit boards are made of identical materials, Boeing still has had to “burn” them all in fire tests—costing as much as \$10,000 or more each.

Our team collaborated with the FAA to reduce redundant burning by completing several years of extensive proof-of-concept testing and developing the associated procedures. The FAA subsequently agreed to accept a “similarity” approach for certifying the fireworthiness of specific eligible next-generation printed circuit assemblies now being designed. Establishing their fireworthiness by using data from previously tested similar circuit boards will eliminate some 500 new burn tests on the 787 in its first year alone. Additionally, this similarity process requires industry-standard materials that already include flammability testing of the individual components be used in fabrication of all printed wiring assemblies.

In five years, this system will save around \$30 million for Boeing Commercial Airplanes programs—“cool” savings that will help keep Boeing competitive. ■

Clockwise from left

Ken Hester
Boeing Commercial
Airplanes Systems
Engineering

Shawn Thomas
Puget Sound
Modification/
Certification
Engineering

George Sotolongo
Airplane Systems
Safety and
Airworthiness

Kenneth Young
Material & Process
Technology, FAA
Designated
Engineering
Representative/
Boeing Authorized
Representative –
Flammability

James Peterson
Material & Process
Technology, Senior
Technical Fellow,
Boeing Authorized
Representative –
Flammability

Terry McMillan
Laboratory Technician –
Flammability Testing



BOEING AND THE CURIOUS OF CAMBRIDGE.

Cambridge has always attracted those in search of answers. So, it's not surprising that Boeing would find a world-class partner there in Marshall Aerospace. This innovative company designs and manufactures auxiliary fuel tanks for the longer range 747 and 777. It seems the right answers are best found with the right partner.



www.boeing.com

This is the fourth in a series of new ads created to build awareness of Boeing and its many valuable partnerships in the United Kingdom. Boeing, the largest overseas customer of the UK aerospace industry, currently partners with more than 300 businesses and universities around the country. The advertising campaign has appeared in The Sunday Times, The Economist, New Statesman and other UK publications, and complements current Boeing business and communications activities in that nation.

AMERICA'S BEST DESERVE AMERICA'S BEST TANKER.

America's pilots. They're the finest in the world, the real thing. And they depend on advanced tanker technology that's the real thing. Boeing's leadership in aerial refueling is unmatched in the world, a legacy of trust built on combat-proven performance. And we're ready to fuel the future for America's best, like nobody else can.



This Integrated Defense Systems tanker ad is one of five new ads designed to reinforce Boeing's leadership position in aerial refueling. All five ads depict a Boeing tanker refueling different mission-critical fighter and airlift aircraft; in this ad, a C-17 is about to be refueled. This print campaign will appear in Washington, D.C., publications, key trade magazines and base papers.