

THE BOEING COMPANY

“MOVE TO THE LAKE”

RENTON, WASHINGTON

THE BOEING COMPANY, "MOVE TO THE LAKE"
Renton, Washington

A SEISMIC SHIFT

In the aftermath of an earthquake, NBBJ helped Boeing transform unused factory space into an opportunity to revolutionize their culture by aligning their people and process around their product.





client VISION

Boeing was streamlining its production while seeking to increase productivity and increase collaboration between design engineers and mechanics. When 1,200 office workers were displaced by earthquake damage, Boeing decided to relocate staff to its Renton plant and asked NBBJ to design a factory-office hybrid that would transform team interactions.

design BREAKTHROUGH

NBBJ worked with a set of business drivers that helped align individual and corporate needs with specific design solutions. A “parts-to-whole” concept for the overall space design brought focus to the aircraft and reinforced the Lean assembly process through everything from an artwork program to environmental graphics.

organizational VALUE

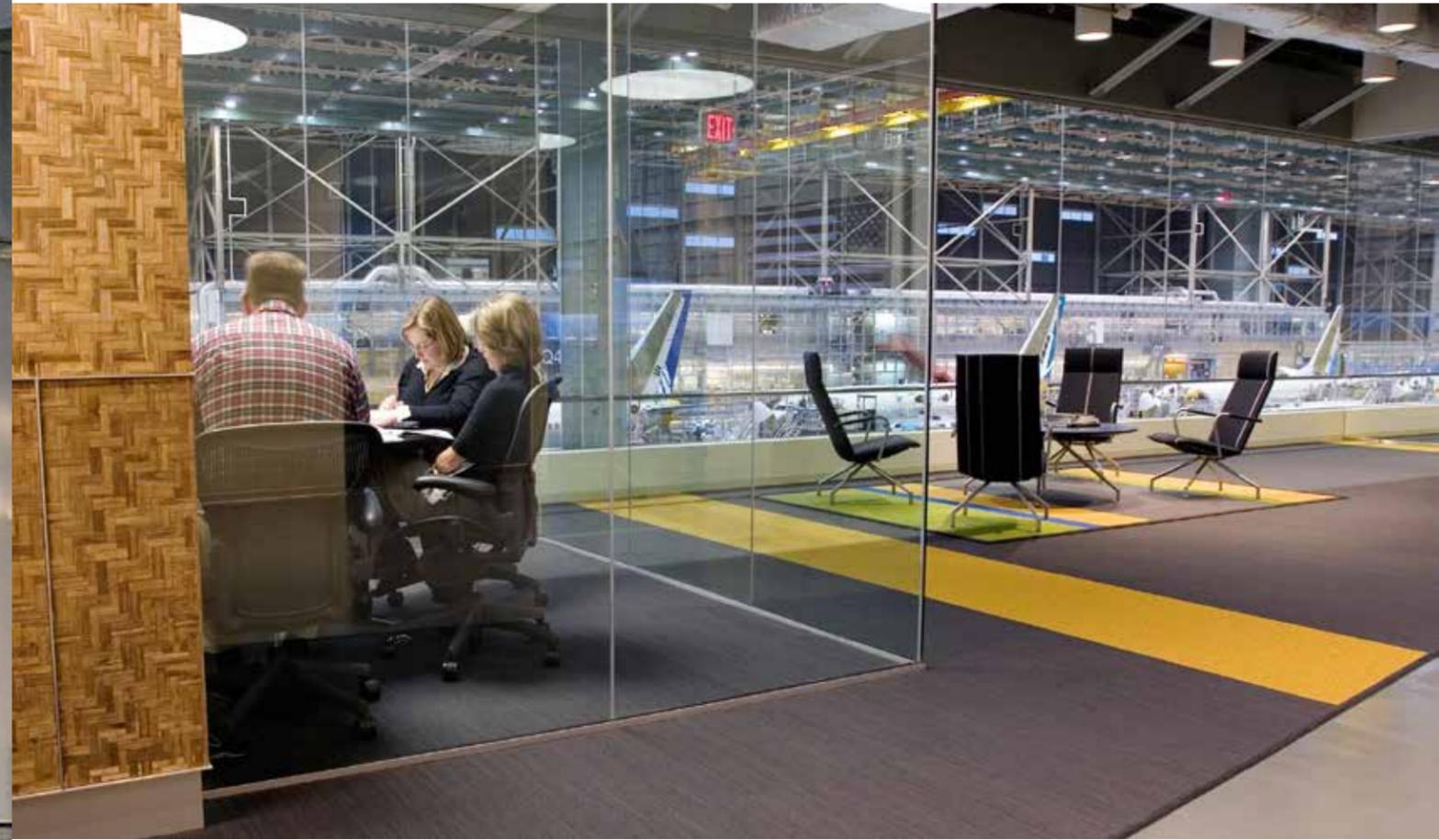
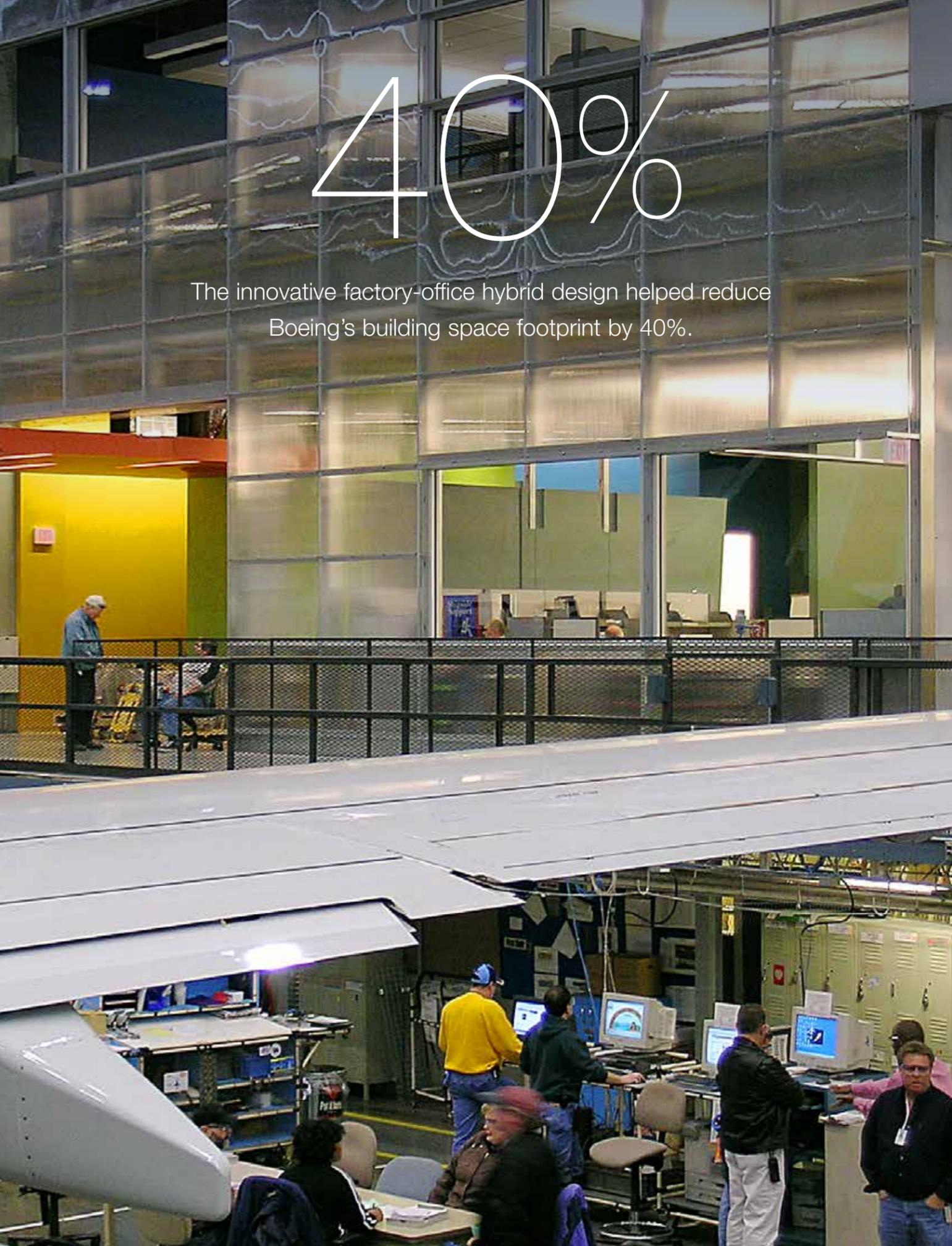
Post-occupancy measures revealed a culture shift from two distinct groups to one team, earlier and better problem solving and a greater sense of pride when planes go out the door. Productivity gains of 50% were realized, along with a space reduction of 40%.

springboard INSIGHT

Putting business goals in sight for every employee and getting them engaged in the process makes everyone an active stakeholder in the company's success.

40%

The innovative factory-office hybrid design helped reduce Boeing's building space footprint by 40%.



DISASTER BECOMES AN OPPORTUNITY

Boeing, one of the world's leading aerospace companies with nearly 12,000 commercial jetliners in service worldwide, makes up roughly 75% of the world's fleet. In 2001, the two disastrous events of the Nisqually earthquake in Seattle and 9/11 became the perfect catalysts for Boeing's leadership to implement a complete cultural shift in the way they worked. The quake destroyed several of Boeing's buildings and displaced 1,200 engineers and support staff, while the events of 9/11 brought the airline industry to a halt. In a time when competition with Airbus for market share was fierce, Boeing needed to keep pace with the demand for its 737, the most popular commercial airplane on the market.

Already in the midst of adopting Lean manufacturing principles, Boeing took this moment-in-time opportunity to move its displaced engineers into vacant warehouse space at the 737 plant located on Lake Washington—an initiative called "Move to the Lake." The plan was to break down the traditional barriers between the people who designed the product and those who

built it, by bringing them together under one roof. As Boeing shifted from storing parts to "just-in-time delivery," large spaces in the three towers that ran along the length of the factory's assembly floor were freed up. NBBJ used these vacant towers to insert 200,000 square feet of office space in the plant, creating a factory-office hybrid where engineers could work alongside aircraft assemblers.

THE FACTORY-OFFICE HYBRID Moving staff into the factory meant bringing them closer to the product as well as using existing space more efficiently. By creating a factory-office hybrid, rather than rebuilding new offices elsewhere, Boeing's footprint was reduced from 300 acres to 204, with covered factory and building space reduced by 40%. Shortly after moving in, employees noted a greater feeling of connectedness with each other and the product, faster problem solving, and a higher sense of satisfaction when airplanes were completed.



“The biggest change was that it gave people the opportunity to know they didn’t need to do things the same way anymore. We began mapping processes better because everyone began thinking about how their work flowed to and from others. It broke down barriers.”

— KENDALL KRIEG, MANAGER, PILOT ENGINEERING GROUP

from 22 to 11 days

The average time for building a Boeing 737 jetliner went from 22 to 11 days—a 50% increase in efficiency.

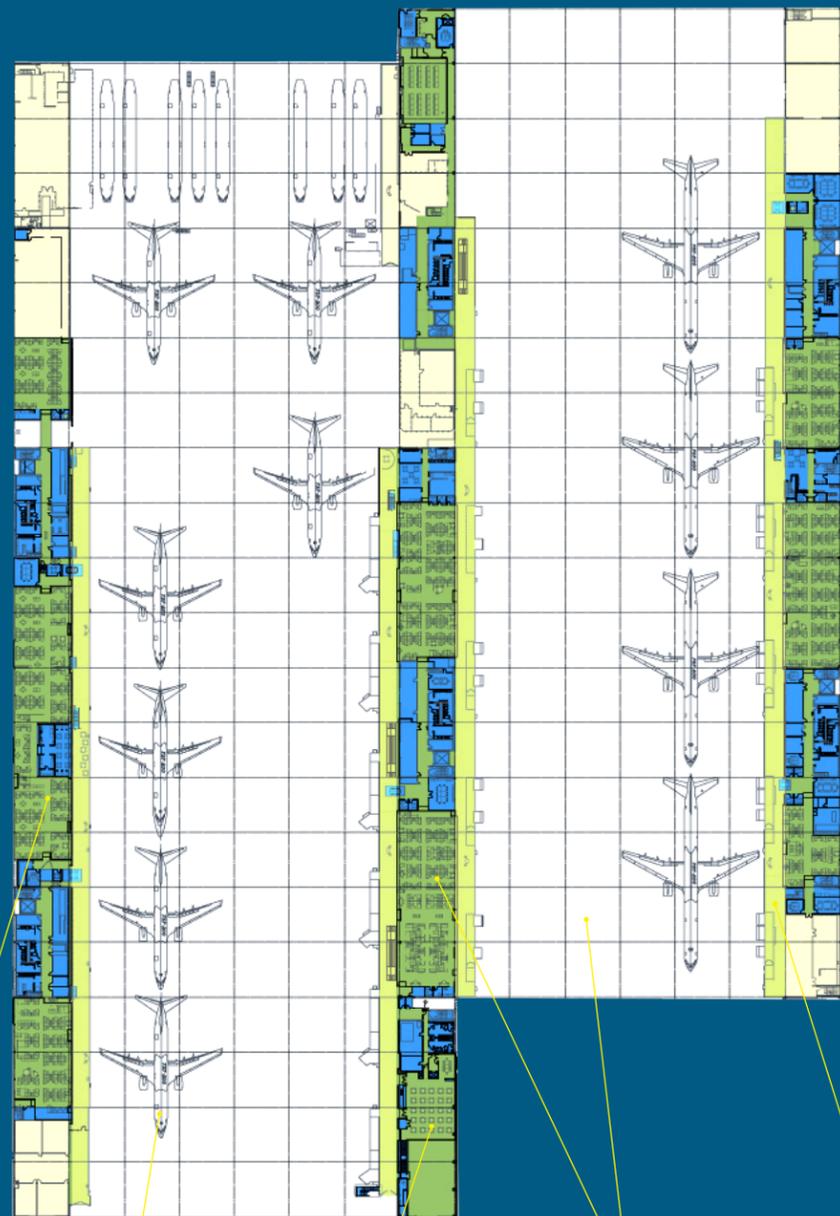
The factory is designed like a large-scale showroom, where the planes can be seen from anywhere in the building. This visual connection is key to maintaining the Lean assembly line and engaging all employees in the process. When a problem occurs, the powerful visual cues of warning lights or a halted line can be seen by everyone and signal immediate action from engineers and mechanics who can huddle within minutes to solve the problem in real time. If the problem cannot be solved, the plane must be taken off

the floor and is turned perpendicular to the line—a visual effect that profoundly impacts the entire workforce. In most circumstances, what once took days or weeks to solve can now be solved within an hour. The unique combination of introducing the Lean assembly line, creating proximity between engineers and mechanics, and providing a constant visual connection to the plane helped Boeing cut their production time in half, from 22 to 11 days, for every plane.



760,000 SF

2.5 CITY BLOCKS



THE GROUND FLOOR OF THE ASSEMBLY BUILDING IS APPROXIMATELY 2.5 CITY BLOCKS LONG AND 50 FEET WIDE—ALL INDOORS—COVERING A TOTAL OF 760,000 SQUARE FEET.

FIVE 737 PLANES AT A TIME ARE LINED UP ALONG A 300-FOOT-WIDE SPACE, MOVING ALONG THE FACTORY FLOOR AT TWO INCHES PER MINUTE.

THREE "OFFICE BUILDINGS" ARE ERECTED ON THE EAST AND WEST SIDES OF THE FACTORY, AS WELL AS DOWN THE MIDDLE TOWER, WHICH ALSO HOUSES AN EMPLOYEE SERVICE CENTER.

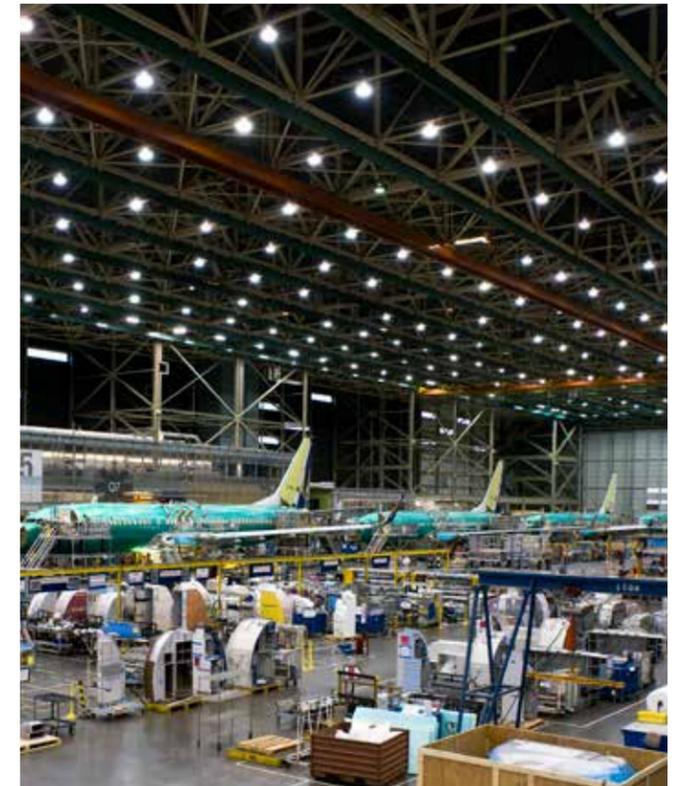
1,200 BUSINESS AND ENGINEERING EMPLOYEES WORK IN THE THREE-STORY OFFICES, WHILE AT THE SAME TIME, 900 MECHANICS ARE AT WORK ON THE FACTORY FLOOR.

A "BOARDWALK" THAT IS AS WIDE AS A CITY STREET EXTENDS OUTSIDE THE OFFICES AND IS THE MAIN THOROUGHFARE FOR EMPLOYEES.

367,000 PARTS, BOLTS, RIVETS & FASTENERS + 36 MILES OF ELECTRICAL WIRE = 1 AIRPLANE



BEFORE: Traditional manufacturing occurred in static bays



AFTER: Lean manufacturing principles led to a moving assembly line

A "PARTS-TO-WHOLE" DESIGN CONCEPT

The major driver behind Move to the Lake was to enable faster and better production through everything from Lean manufacturing principles to the design of the office space. Lean practice involves changing a business process to maximize efficiency, eliminate waste, and improve flow, quality and safety.

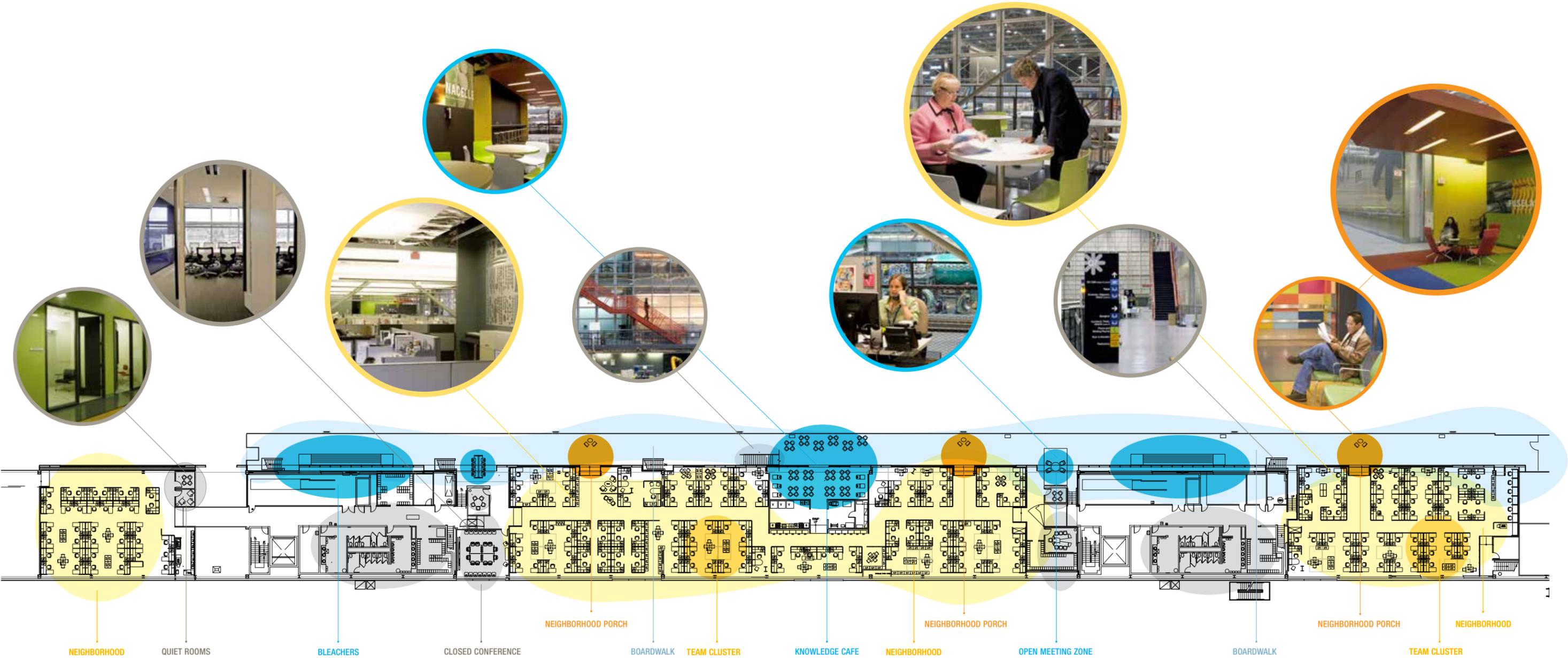
Boeing was the first commercial airplane manufacturer to adopt Lean manufacturing principles in its production line. This meant moving away from traditional manufacturing in static bays to a moving assembly line similar to that used in car production. Rather than producing and stockpiling inventory to meet sales forecasts (the basis for traditional manufacturing), Lean manufacturing implements just-in-time production driven by customer demand, which cuts down on unnecessary inventory.

ON THE FACTORY FLOOR The aircraft moves down the factory floor at a rate of two inches per minute and everyone and everything on the floor contributes to maintaining the flow of product with as little disruption as possible. Equipment, parts and tools are delivered and staged at

point-of-use so mechanics no longer have to go looking for what they need. Beacon lights along the assembly floor turn from green to yellow to purple when a problem occurs so solutions can be sought immediately, and timelines painted on the floor indicate progress relative to the schedule. Some assembly work is done off the main line (e.g., seat assembly) to save time and space around the plane, and when the aircraft is ready to receive these components, feeder lines bring them into the aircraft for final assembly.

IN THE WORKPLACE The design team carried over the parts-to-whole assembly concept to the design of the new office space. Employees sitting at their desks or in meeting rooms are given a constant visual connection to the assembly line through large windows overlooking the factory floor. Reclaimed bamboo from Boeing's Chinese shipping crates was used to create meeting room walls, and artwork features repurposed airplane parts. Giant alpha-numeric environmental graphics were composed of smaller numbers or letters for legibility up close, and when viewed from across the assembly floor or building.

CELEBRATING PEOPLE, PLACE AND PRODUCT



FROM CONCEPT TO REALITY

The work place is designed around teamwork, celebrating the aircraft and making everyone feel a part of Boeing's mission. Using the six business drivers for success, NBBJ helped Boeing create a more democratic space where employees can quickly access the office or factory floor, meet in cafés or do heads-down work in quiet rooms—without ever losing sight of the aircraft.

Breaking Down Barriers

A wide boardwalk—formerly a staging area for aircraft parts—extends outside the offices and opens to the factory floor. Executives, engineers and mechanics frequently meet along this boardwalk, which contributes to the feeling of a democratic workplace that brings office and plant workers together.

In Plane View

Offices are located alongside the assembly line, making the aircraft an integral part of daily work life. Office tower walls made of translucent, polycarbonate panels and transparent glazing buffer noise from the factory floor, provide a level of privacy to the mechanics below, and allow office workers views of the airplanes as they are being built.

The Right People in the Right Place

Flexible, open-plan offices are zoned in neighborhoods where groups of people who need to work together are seated near each other. No hard-walled offices exist since work spaces are designed with equality and openness in mind, with plenty of room for spontaneous collaboration or quiet heads-down work.

Collaboration in Action

Informal meeting areas and café spaces are strategically located to break up the long span of the office towers and to encourage staff to move freely in and out. An employee service center and cafeteria offer additional places to meet.

An Artful Reminder

Artwork made from surplus airplane parts, including reclaimed bamboo packing crates as wall coverings, reinforces the spirit of the assembly process throughout the offices.

“We’ve established a visual link with the airplane. By bringing people closer together, we are creating a manufacturing environment that connects our people and our products. Every day we’re going to celebrate the great products we design and build here in Renton.”

— CAROLYN CORVI, FORMER VICE PRESIDENT & GENERAL MANAGER, AIRPLANE PRODUCTION





CREATING HUMAN SCALE

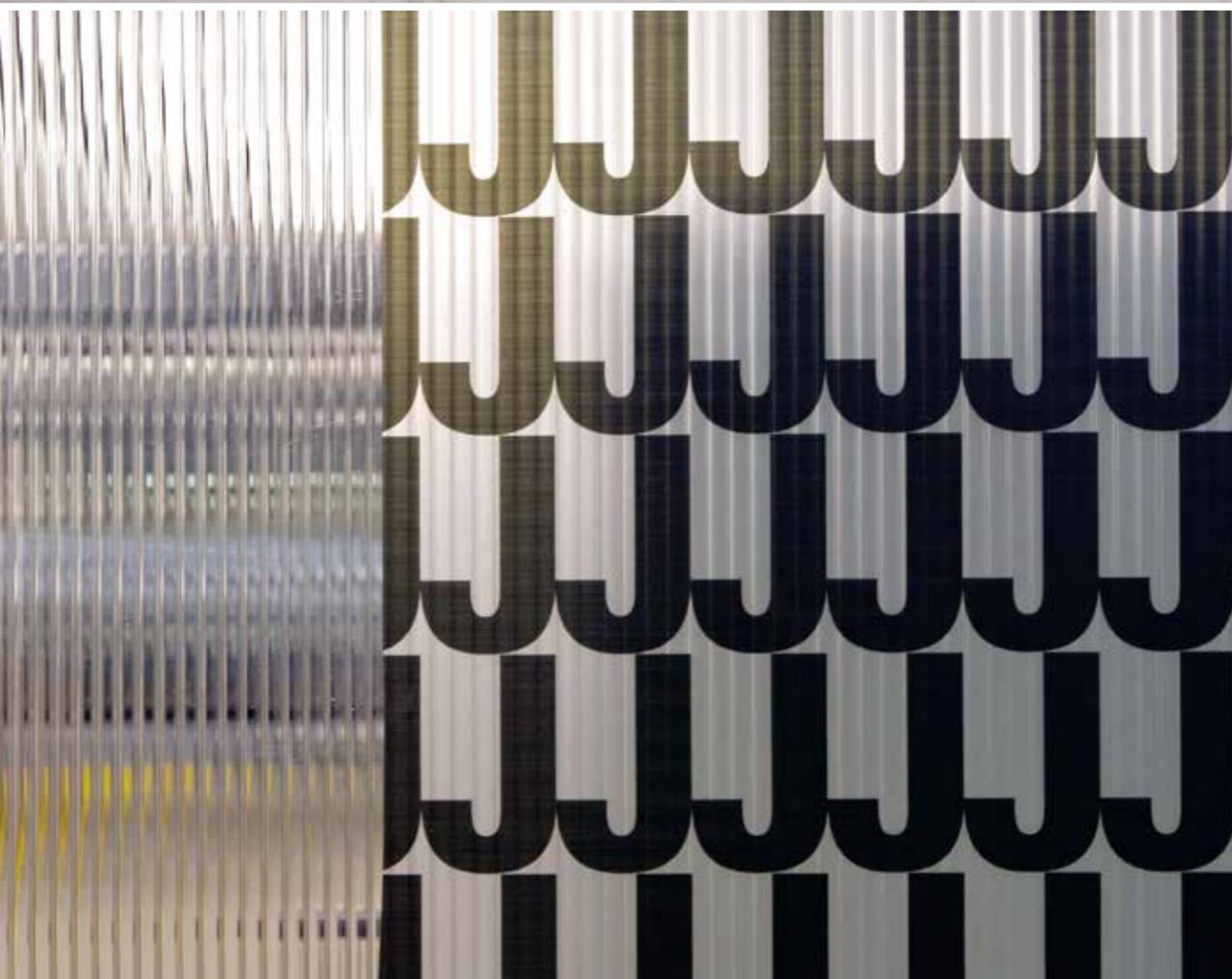
A key challenge was breaking down the scale of the enormous Renton building to create comfortable spaces and bring order to a complex environment. Multiple zones were designed to offer a variety of experiences that break the space down into more moderately scaled areas.

Neighborhood porches, cafés and meeting areas—dotted along the boardwalks to give employees more intimate options for meeting—feature lower ceiling heights that help shift away from the vast volume of the factory to a more human-scaled space.

THE RIGHT TO LIGHT

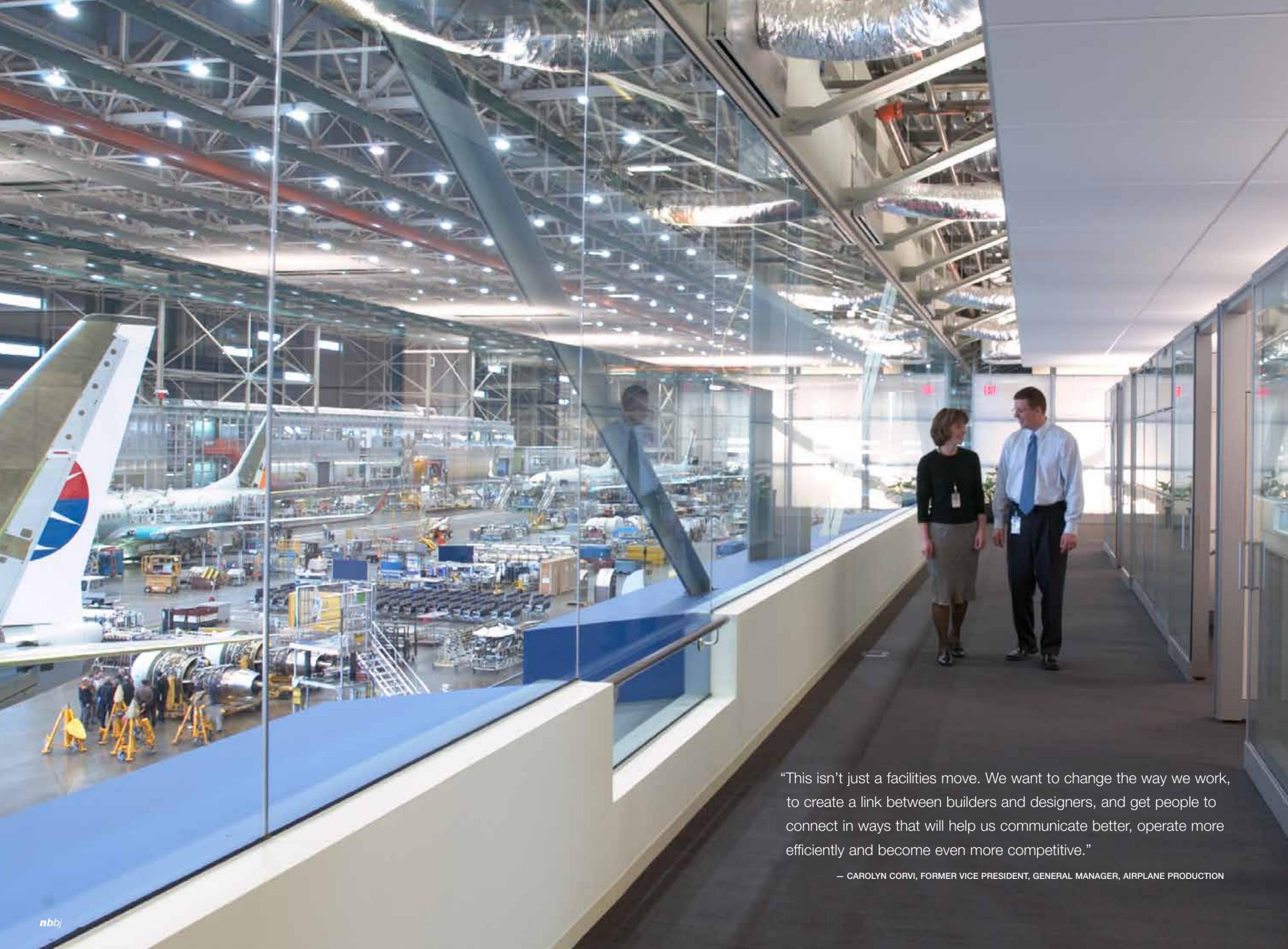
To make the space more livable for everyone, dozens of windows were installed on the exterior walls to bring natural light into the factory—a space that traditionally shuts daylight out. An employee cafeteria (image, right) with expansive windows offers views of Lake Washington and provides employees and executives a place to gather and share a meal.





FINDING DIRECTION

Large-scale, directional graphics provide wayfinding within the building. The color story for the office spaces and signage was pulled from the myriad of bold colors seen on the factory floor. Color-coded spaces help orient people—green for small conference rooms, light blue for cafés, yellow for restrooms and red for stairs. Additional signage guides staff to areas named after international cities, reminding employees of how their work connects people around the world.



CLIENT
The Boeing Company

SIZE
760,000 SF

COMPLETION DATE
2003

NBBJ SERVICES PROVIDED
Architectural design, interior design, environmental graphic design

AWARDS
International Illumination Design Awards, Regional Merit Award, 2006

American Institute of Architects, Seattle Chapter, Award of Merit, 2005

International Interior Design Association, Northern Pacific Chapter, INawards, 2005

Society for Environmental Graphic Design, Merit Award, 2005

PUBLICATIONS
"Boeing's Building Boom," *Metropolis Magazine*, July 2005

"Boeing's Move to the Lake Project," *Puget Sound Business Journal*, June 2004

"Shakers & Movers," *Frontiers*, June 2004

"This isn't just a facilities move. We want to change the way we work, to create a link between builders and designers, and get people to connect in ways that will help us communicate better, operate more efficiently and become even more competitive."

— CAROLYN CORVI, FORMER VICE PRESIDENT, GENERAL MANAGER, AIRPLANE PRODUCTION

ABOUT NBBJ

NBBJ is an award-winning global design and architecture firm focused on helping clients capitalize on the relationship between people and the design of physical space to enhance organizational performance.

Partnering with some of the world's most innovative companies, including several Fortune 500 firms, NBBJ has set new standards for flexible and results-driven office environments. Our approach to corporate workplace design focuses on aligning our client's brand and business goals with design solutions that inspire innovation, leverage technology and enhance the unique business goals and culture of each company. We critically examine how a workplace functions to design environments that enable creativity, efficiency, cost-effectiveness and sustainable practices.

NBBJ has won numerous awards for our corporate design work, including the CoreNet Global Sustainable Leadership Award, the FIABCI Prix d'Excellence, the Business Week/Architectural Record Award and the AIA National Honor Award. Our network of offices enables us to deliver quality projects that are regionally and locally appropriate. It allows us to act as a single creative force by leveraging the latest thinking from NBBJ colleagues in other locations and bringing a rich blend of expertise to each project.

NBBJ SERVICES

| | |
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| Master Planning | Workplace Consulting |
| Architecture | Programming |
| Interior Design | Land-Use Planning |
| Financial Analysis | Construction Administration |
| Project and Cost Management | Retail Planning and Design |
| Graphic Design and Signage | Facility Planning |
| Space Planning | Change Management |
| Lighting Design | |