



2024 CHIEF
AEROSPACE
SAFETY
OFFICER
REPORT

A Message from the Chief Aerospace Safety Officer



Michael P. Delaney
Boeing Chief Aerospace Safety Officer

Advancing an enduring foundation of safety

Over the past several years, we've continued our focus on an enduring foundation for product safety at Boeing.

The safety of our products demands **our safety culture** be built on detailed aerospace knowledge, transparency and accountability.

Our safety practices are those systems and structures inside Boeing that ensure product safety is at the forefront of everything we do and every decision we make.

Our safety collaborations are the actions we take alongside those outside of Boeing to help make the entire industry safer.

The safety of our products starts with quality work across our design, manufacturing and support operations. The 737-9 accident in January of this year was a stark reminder of this inseparable link, and we have work to do to ensure



Our safety culture

Fostering transparency, openness and accountability for the way we work



Our safety practices

Enabling predictive risk management through data analytics and insights



Our safety collaborations

Leading with humility for a safer industry, collaborating with customers, regulators and others

that every Boeing employee understands that vital connection — and our role in identifying hazards and issues that must be addressed.

Our efforts remain focused on maturing and inculcating our Safety Management System (SMS). We are also focused on fostering a culture where every person feels safe and empowered to speak up when they have a safety or quality concern. These efforts will help us address the findings and recommendations of the Congressionally-authorized and U.S. Federal Aviation Administration-initiated Expert Panel Review of our SMS and culture.

Our mission is to ensure safety of flight with a culture rooted in safety. Our actions are driven by guiding principles, chief among them is:

Safety, compliance and conformance of our products and services without compromise

It is part of our promise to never forget our responsibility to make sure every action and decision bring lasting improvements to the quality and safety of our products and services.

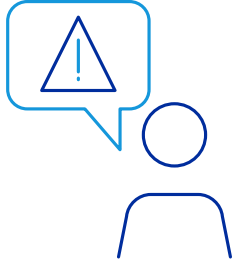
We understand that we must continue to improve our safety culture, practices and collaborations. Progress of these changes, both big and small, is vital to ensuring they will stand the test of time.

This annual report summarizes that progress.

“When it comes to the safety of our products and services, every decision and every action matters.”

Dave Calhoun,
Boeing President and CEO

What's new: highlights from advancements made in the last 12 months



Strengthening our safety culture

- ✓ **Increased** efforts to encourage employees to use the Speak Up reporting channel resulted in a more than 500% increase in the number of submissions during the first two months of 2024 compared to the same period in 2023.
- ✓ **Conducted** product safety training for more than 160,000 Boeing employees that reinforced the importance of speaking up about concerns or issues.
- ✓ **Introduced** a digital learning platform to employees, enabling them to reflect, learn and apply safety lessons to their work.

Improving our safety practices

- ✓ **Established** SMS Boards within program and functional organizations responsible for design, build and fleet support to ensure a bottom-up approach in identifying and resolving potential safety risks.
- ✓ **Began** a pathfinding effort to share additional operational data with engineering teams on how Boeing products are operating in the field, allowing design engineers to validate that designs are working as intended.
- ✓ **Expanded** external safety data sources and developed machine learning algorithms with the FAA to identify emerging hazards and safety trends.
- ✓ **Continued** the release of Design Practices to further strengthen the use of best practices and significantly increased the use of those practices during critical design activity through Technical Design Reviews.
- ✓ **Realigned** the Boeing Internal Audit team in Commercial Airplanes Quality to report to the Chief Aerospace Safety Office to further the independence of the team to conduct their work as intended.
- ✓ **Named** Chris Ferguson, former NASA astronaut and retired director of the CST-100 Starliner Program, as Deputy Chief Aerospace Safety Office for Human Space Flight to extend the foundation of safety of the Starliner Program in a systemic way across current and future space endeavors.



Collaborating for a safer industry

- ✓ **Expanded** Competency-Based Training & Assessment programs to include five additional operators in 2023 for a total of nine customers.
- ✓ **Bolstered** the global team of Flight Operations Representatives to enhance support to the aircrews of more than 170 global operators, more than double the number of pilot engagements from the previous year.
- ✓ **Increased** industry and global regulatory engagement, including establishing a new liaison to support the International Civil Aviation Organization's efforts to advance a harmonized aviation ecosystem.
- ✓ **Expanded** engagement with global safety and regulatory stakeholders to better understand regional safety issues, provide direct technical assistance where possible, foster the sharing of lessons learned from other parts of the world, and direct potential hazards into Boeing's SMS.
- ✓ **Facilitated** an exchange of insights on industry challenges with airline Safety, Training and Flight Operations leaders during the second annual Boeing Aviation Safety Conference.

Why it matters

We value safety above all else and our teammates take that personally — knowing every decision, every detail matters and must be done with transparency and accountability. Safety is about ensuring every person who flies on, uses, operates, designs, builds or services Boeing products gets to their destination safely.



Speak Up



Speak Up is a reporting channel for potential concerns around product and services safety, quality and compliance.

Product safety depends on a culture that is rooted in transparency, accountability, and every person feeling safe and empowered to speak up when they have a concern or make a mistake affecting product safety. This reporting culture is at the heart of Boeing's enterprise Safety Management System, which identifies hazards and mitigates risks within the systems used to design, produce and support its products and services.

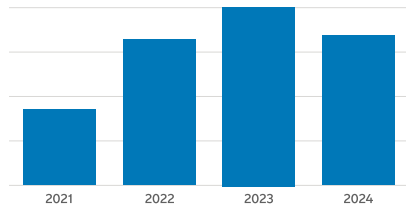
The company's continued efforts to build a strong and transparent reporting culture are vital to the continued success of its SMS. These efforts include encouraging employees to raise concerns and report errors and mistakes, while creating an environment of trust where leaders listen and take appropriate action to address and solve their issues.

Boeing's Speak Up employee reporting channel has received thousands of submissions since it was established in 2019.

Following the January 2024 737-9 accident, the company redoubled its effort to encourage employees to raise concerns about product and services safety, quality and compliance, resulting in a more than 500% increase in number of Speak Up submissions during the first two months of 2024 compared to the same period in 2023. Increased reporting is a sign of progress toward a robust reporting culture.

A new collaboration launched by Boeing, the International Association of Machinists (IAM) 751 in Washington state and

Speak Up Reports Volume by Year



Increased reporting is a sign of progress toward a robust reporting culture. 2024 reflects reports submitted during the first two months.

the FAA is advancing Speak Up’s mission by implementing an event review committee, ERC, based on the model used by airline operators and outlined in FAA advisory material. The implementation of the ERC should ensure issues, concerns and events are raised quickly and reviewed in a fair and factual manner. Representatives from each organization come together to review certain product safety-related issues reported through Speak Up by IAM 751-represented employees. They apply human-centric principles called Just Culture that focus on understanding all of the organizational, technical, operational and human factors behind errors and mistakes.

Training

In 2023, Boeing launched the Just Culture Guiding Principles “leaders teaching leaders” approach to help ingrain the concept of Just Culture and the role it plays in the team’s ability to deliver safe products and services. This approach supplements “Just Culture Essentials” leadership training introduced in 2021. Just Culture Guiding Principles balance individual and systemic accountability for mistakes and errors.

This approach is modeled after aviation industry best practices and helps ensure leaders and employees learn individually and collectively to prevent future incidents. The Just Culture dialogue sessions, led by leaders, specifically help managers understand how to create an environment where employees feel safe and empowered to report errors and are treated fairly for making them, thus enabling learning to prevent them from happening again. Just Culture holds both systems and people accountable for their contributions to incidents and doesn’t tolerate negligence or malicious behavior.

In addition, more than 160,000 employees participated in product safety training that reinforced the importance of speaking up about concerns or mistakes, as well as the culture that supports such transparency.

“Creating an environment where people feel comfortable and safe coming forward to address product safety, either peer to peer, or leader to team, must remain at the forefront of all that we do, because every decision matters.”

Zach Jovanovich,
Manufacturing manager

Continuous learning

In 2023, Boeing introduced a digital learning platform to employees. The Safety Experience at Boeing brings together 100-plus years of industry safety practices, engineering knowledge, innovations and insights from accident investigations.

Employees can learn from history and storytelling how even the smallest decision or detail can affect the safety of our products. An interactive timeline is the central part of the platform. It contains a wealth of content, including an immersive interactive tool that shows how history and innovation have led to advancements in aviation safety, allowing people to see the connections between events.

The platform provides a forum for employees to reflect, learn and apply safety knowledge to their work, while never forgetting the hard lessons of the past. Boeing is expanding access to this resource to key stakeholders in 2024 to increase transparency and collaboration to further safety across the global industry.

The company also completed a major upgrade of its Safety Experience Center (formerly known as the Safety Promotion Center) in Everett, Washington. The physical center complements the digital platform and provides employees an opportunity to visit, learn and reflect on Boeing's safety culture and lessons from the past.



IMPROVING OUR SAFETY PRACTICES

Safety Management System maturity

Underpinning Boeing's safety practices is its Safety Management System (SMS). The company's SMS operates in conjunction with long-standing product assurance processes and continues to mature.

The SMS identifies product safety hazards and then mitigates risks. For quality issues as with other potential hazards, the SMS evaluates all potential negative outcomes and develops risk controls that could include the design, how the parts are produced, what inspections are in place and even what instructions are given to operators in order to mitigate the product safety risk.

In 2023, Boeing implemented **SMS Boards** within product and functional organizations that are responsible for the design, build and support of the flying fleet. The SMS Boards identify, track and mitigate risks within their areas of operation while considering all the technical, cultural and systemic factors that contribute to a particular issue or change.

It is an approach that leads to a more thorough consideration of risks and proactive steps to address them. If appropriate, SMS Boards can elevate potential risks to the SMS Accountable Executive, currently the Boeing CEO, and the Board of Directors [Aerospace Safety Committee](#) , ensuring attention and resolution of potential issues from a bottom-up approach.

Safety and quality are inseparable

Improving SMS and quality control








SMS Boards use the **safety risk management (SRM)** process to assess hazards and manage actions to mitigate risks. Through an SRM, Boeing teams evaluate all potential negative outcomes associated with a change or uncontrolled hazard and develop risk controls that could include the design, production and support of the company's products and services. The company has applied the SRM process to several issues in recent years, implementing mitigation plans and reducing risks.

In addition, earlier this year, the FAA mandated all design and manufacturing companies to implement an SMS. As the industry transitions to a final rule, Boeing will enhance its voluntary SMS, which was approved by the FAA in 2020 and reconfirmed in 2021, to meet the new regulation. Boeing is also engaging with other design and manufacturing companies, as appropriate, to both contribute and learn from others as the industry creates a common method for implementing the SMS.

Boeing's SMS works together with its Quality Management System (QMS) to assure product quality and safety. As a design and manufacturing company, Boeing designs to regulatory and customer requirements, builds and validates that the product meets those requirements, and supports the customer to ensure it is operating as intended.

The QMS is a foundational system focused on regulatory compliance and customer satisfaction. It accomplishes its mission through inspections or upstream work with design or tooling teams to ensure the final product meets quality standards.

Boeing is increasing and accelerating comprehensive efforts to inculcate its SMS and advance its safety culture to strengthen quality. These actions will help address the FAA's findings and the recommendations of the Congressionally authorized and FAA-initiated Expert Panel Review of our SMS and safety culture. These actions include:

-  **Advancing** the safety culture through increased employee engagement and communication.
-  **Reducing** defects by ensuring production work is completed in sequence at its assigned factory location, and addressing them within the supply chain.
-  **Simplifying** installation plans, processes and production work instructions.
-  **Improving** existing and creating new training programs to ensure employees meet new proficiency standards.
-  **Enhancing** Information Technology systems, including in many cases, mistake proofing processes and monitoring the effectiveness of these processes using data analytics.
-  **Utilizing** key performance indicators (KPI) to measure and monitor safety, quality and the health of the production system.
-  **Applying** Safety Risk Management when those KPIs approach or exceed their control limits.

Data sharing and analytics

In a move to further reinforce and strengthen the direct link between safety and a strong quality system, Boeing realigned the Internal Audit team in Commercial Airplanes Quality organization to the Chief Aerospace Safety Office in February 2024. This realignment furthers the independence of the audit team to conduct their work as intended. The company is exploring other measures to strengthen the effectiveness of the audit function, including conducting additional risk-based product audits and ensuring the team has all the necessary resources for the critical tasks they perform.

The engine driving Boeing's SMS is data collected from its employees and production system, as well as operational data from many external sources. Last year, the company expanded external safety sources, aggregating data from ADS-B (automatic dependent surveillance-broadcast) sources, regulatory databases and fleet operations.

Boeing data analytics experts worked with the FAA's Aircraft Certification Service (AIR) to jointly develop machine learning algorithms to identify emerging hazards and safety trends. Specifically, the project centered on using machine learning to classify publicly available Service Difficulty Reports provided to the FAA by operators into hazard categories. For Boeing, this has created a more robust pipeline of information into its Continued Operational Safety Program, which continually monitors the performance of aircraft worldwide to identify hazards and opportunities for improved safety. The company is working to extend these algorithms into other data streams as a means to ensure all potential hazards experienced by its products are proactively managed in its SMS.

Boeing and the FAA are sharing these machine learning algorithms through [GitHub](#), an online platform for open-sourced projects, to expand knowledge sharing and data analytics capability throughout academia and industry and to accelerate hazard identification.

In 2023, the company enhanced its efforts through new processes to collect airplane operational data provided to Boeing engineering teams. This data is gathered through Operational Information Cases, which use operational data from the fleet to evaluate the assumptions made at the time of initial aircraft design.

Findings from these investigations are used to help engineers understand the **operational aspects of their designs**, drive action to address any risks associated with outdated assumptions, and inform future designs. As of February 2024, Boeing completed the data collection and analysis for 14 such investigations.

Boeing continues to make progress in curating 100-plus years of the company's **Design Practices**. These design practices support SMS processes by identifying and disseminating lessons learned and best practices among current and future generations of engineers. As of early March 2024, the total number of design practices released to date is 2,400.

Disciplined engineering practices

ODA improvements

These design practices are used during independent **Technical Design Reviews** where frank and transparent discussions are held among engineers and independent reviewers with appropriate domain expertise. They are essential to identifying risks and issues earlier in the design process and help ensure first-pass engineering quality. More than 750 technical design reviews were conducted in 2023, complementing preliminary design reviews, critical design reviews and other industry-standard reviews to ensure technology or manufacturing readiness.

Boeing also continues to make progress on a portfolio of initiatives to strengthen the **ODA** program and improve the independence of Boeing employees selected as ODA unit members who are authorized to perform certain functions on behalf of the FAA.

With direction from and in coordination with the FAA, these initiatives focus on improving ODA oversight, its administration, and to further improving the unit member appointment process and skills development. A significant portion of the initiatives focus on increasing the support system for ODA unit members and ensuring they are able to perform their delegated duties free from interference.

Among the improvements in 2023, Boeing

- ✓ **Completed** the re-organization of the unit members to give them an independent reporting structure aligned with their functional engineering organizations. This change included the addition of dozens of new senior managers aligned to support the strengthening of the ODA system.
- ✓ **Implemented** an annual assessment of the effectiveness of the Boeing ODA Administration team's oversight of the ODA program. The process includes input from the FAA and self-assessments. Its goal is to improve support to the ODA unit.
- ✓ **Updated** the Unit Member Interference Reporting Process and associated training to align with the FAA's new guidance related to ODA interference reporting and explicitly affirm that any employee, or supplier employee belonging to Boeing's ODA, can report potential cases of interference.
- ✓ **Created** a digital badge identification system that increases employee awareness of when they are engaging ODA members online to help prevent potential interference. This digital identification is visible in email and Intranet platforms.

Measuring progress

To understand the progress of these initiatives, Boeing with FAA oversight once again commissioned an external company to survey ODA representatives to better understand perceptions of interference and integrity culture. Of the more than 900 Boeing employees who received the survey, there was a strong response rate of 66%.

When asked if they have encountered a situation where they perceived interference directed at them in the last 12 months, 12.1% indicated that they had experienced interference, down from 13.9% in 2022. Among non-Boeing (suppliers) representatives, 3.4% indicated that they had perceived interference within the past 12 months, down from 9.6% in 2022 survey results.

In addition, a supplemental survey was deployed in February 2024 to understand unit members' impressions of the specific changes implemented. With a similar response rate as the initial survey, unit members rated the effectiveness of each improvement initiative. All of the initiatives were viewed as favorable with effectiveness ratings ranging between 73% and 95% positive. The results also highlighted areas for improvement to further enhance effectiveness. Although results indicated favorable views for all of the changes and their positive impact on the ODA system, there is still work to do to strengthen the ODA program and these ongoing surveys will be used to refine the improvement initiatives.

Expanded safety focus

In April 2024, Boeing named Chris Ferguson, former NASA astronaut and retired director of the CST-100 Starliner Program, as Deputy Chief Aerospace Safety Office for Human Space Flight. The move expands CASO's focus on strengthening the global aerospace safety ecosystem to include the next era of human spaceflight. Ferguson will extend the Starliner Program's foundation of safety in a systemic way across current and future space endeavors.



COLLABORATING FOR A SAFER INDUSTRY

Through its enduring efforts to improve operational safety, Boeing has engaged more than 200 airline operators in supporting, developing and implementing comprehensive, integrated solutions that further strengthen the safety of the global air transportation system.

Enhanced flight crew support

In 2023, Boeing bolstered its global team of Flight Operations Representatives to enhance support to the aircrews of more than 170 global operators, more than double the number of pilot engagements from the previous year.

This team now includes more than 140 highly experienced professionals who continue to develop and strengthen Boeing's relationships with operators globally. Flight Operations Representatives facilitate two-way safety communications with aircrews of airlines that operate Boeing products. Not only do these team members serve as on-site advisers for airlines' flight operations safety programs, but they also send back to Boeing teammates ideas and observations on how to further strengthen safety.

Competency-based training and assessment

Additionally, last year Boeing progressed in its evolution toward a competency-based training and assessment (CBTA) paradigm. This training approach melds nine competencies that include essential technical knowledge to safely operate and maintain Boeing products with leadership skills, such as teamwork, communications and workload management, that let crew members maximize the usefulness of their technical know-how. Boeing expanded the CBTA programs to include five additional operators in 2023 for a total of nine customers.

To date, Boeing has conducted 15 workshops with training leaders representing 93 airline operators and 24 regulatory bodies. Additionally, CBTA courses for the Next- Generation 737, 737 MAX and 787 were approved by multiple regulatory agencies. The company also deployed its Virtual Procedures Trainer, which provides experiential training and complements current training programs, to 16 customers. Additionally, Boeing continues to use Maintenance Synthetic Trainer in maintenance training programs, and eight customers have adopted it for use in their own training programs.

Strengthened global safety and regulatory engagement

For the past few years, Boeing has also been expanding engagement with global safety and regulatory stakeholders. These enhanced partnerships are focused on developing a better understanding of regional safety issues, providing direct technical assistance where possible, fostering the sharing of lessons learned from other parts of the world and directing potential hazards into Boeing's Safety Management System. To date, regional safety teams have captured potential hazards ranging from inconsistent SMS implementation at airlines to inconsistent interpretation of checklist language by crews. To better support these engagements, the company has tripled the size of its global safety and regulatory team to more than 60 employees worldwide.

Continued collaborations with other industry stakeholders

In addition to ongoing stakeholder engagement, Boeing continues to facilitate an annual large-scale exchange of safety information and insights on industry challenges. In February 2024, the company conducted its second annual Boeing Aviation Safety Conference, where more than 210 representatives from 91 carriers, pilot associations and regulatory agencies gathered in Abu Dhabi, United Arab Emirates, to share knowledge, best practices and lessons learned.

The company's partnerships also extend to academia. In March 2024, the Boeing Center for Aviation and Aerospace Safety officially opened at Embry-Riddle Aeronautical University. This center conducts research to mitigate known and emerging operational safety risks to advance safety across the entire industry.



Boeing Aviation Safety Conference,
February 2024