

IN FOCUS

Federal Aviation Administration Oversight of Boeing

Commercial air travel is one of the safest forms of transportation, and fatal crashes are extremely rare. Between 2013 and 2022, U.S. air carriers flew more than 175 million cumulative flight hours and experienced six fatal crashes resulting in 15 total fatalities. The International Air Transport Association found that global airline safety performance improved by 61% over the past decade. Although design flaws and manufacturing defects have seldom played a significant role in commercial aviation crashes, two fatal mishaps and additional serious incidents involving Boeing airplanes have brought its design and manufacturing processes under global scrutiny. As the sole producer of large transport airplanes in the United States, Boeing is a major focus of Federal Aviation Administration (FAA) oversight. In the wake of these events, FAA has increased oversight and inspections of Boeing aircraft development and manufacturing, and Congress has scrutinized both Boeing and FAA. Some ongoing challenges to effective FAA oversight of Boeing include production pressures spurred by continued global demand; the complexity of a distributed and diverse supply network; challenges at FAA to recruit, retain, and train its inspector workforce; and heavy reliance on delegated aircraft design and production certification functions.

Boeing Commercial Airplanes

Boeing Commercial Airplanes (BCA) is a business unit of the Boeing Company, a global aerospace conglomerate. BCA employs about 48,000 workers, primarily at facilities in Washington State and South Carolina. Boeing produces a number of commercial airliners, including the narrow-body 737 and three wide-bodies: the 767, 777, and 787 Dreamliner. In 2023, it ended production of the iconic 747 jumbo jet. More than 10,000 Boeing jetliners are in service around the world, and more than 5,400 of its airplanes are currently on order. In 2023, Boeing delivered 528 airplanes, a 10% increase over 2022. However, production caps imposed by FAA in early 2024 amid concerns over quality assurance along with a 2-month machinist strike have slowed deliveries by about 20%, compared with 2023.

Long-standing Safety Concerns

For over a decade, FAA has been raising concerns about Boeing aircraft. In 2015, Boeing entered into a settlement agreement with FAA following multiple failures to take corrective actions regarding observed deficiencies in quality assurance. As part of the agreement, Boeing committed to implementing a Safety Management System (SMS), adopting a regulatory compliance plan, and stepping up audits and verification processes to oversee suppliers and component parts. Despite these actions, concerns over the quality and safety of Boeing airplanes and the adequacy of FAA oversight of Boeing design and manufacturing practices have persisted. These concerns have primarily focused on Boeing's two most modern commercial airplanes: the Boeing 737 Max and the Boeing 787 Dreamliner.

Trouble with the Max

The 737 is considered Boeing's narrow-body stalwart. Boeing has delivered almost twelve thousand 737s since the model's initial introduction in 1967. The most recent iteration, the Boeing 737 Max, made its debut in 2016, offering more quiet, fuel-efficient engines and other performance improvements. However, two catastrophic passenger airline crashes overseas—Lion Air Flight 610 on October 29, 2018, and Ethiopian Airlines Flight 302 on March 10, 2019—led to a 20-month worldwide grounding of all 737 Max airplanes and halted deliveries until November 2020. Broader concerns over the certification of the 737 Max prompted intense scrutiny of FAA's delegation of certification responsibilities to Boeing, culminating in legislation requiring sweeping reforms to the aircraft certification process and FAA's oversight of aircraft manufacturers and their certification units. The 2020 Aircraft Certification, Safety, and Accountability Act (Division V of P.L. 116-260) required FAA to reform policies and practices related to aircraft certification and mandated industry-wide implementation of FAA-approved SMS programs.

On January 5, 2024, a Boeing 737 Max airplane operated by Alaska Airlines experienced an in-flight separation of a door plug, a covering for an emergency exit opening that is installed when a door is not required. Following the mishap, which caused some injuries and no fatalities, FAA launched an investigation of Boeing manufacturing processes and ordered a comprehensive audit of the 737 Max production lines and supply chain to evaluate compliance with FAAmandated quality procedures.

A February 2024 incident, where the rudder controls of a United Airlines Boeing 737 Max became stuck during landing at Newark Liberty Airport, prompted a National Transportation Safety Board (NTSB) investigation. NTSB found that incorrectly assembled rudder actuator bearings in an automated control unit are susceptible to freezing, possibly limiting rudder movement in cold weather. A similar incident involving an Aeromexico 737 Max in March 2023 prompted Boeing to issue a notice to operators. In September 2024, NTSB urged FAA and Boeing to take immediate corrective action. In October 2024, FAA issued a safety alert advising operators of affected aircraft to carry out rudder system checks before landing and to follow stuck-rudder procedures if a jam is suspected.

Boeing had previously experienced rudder system issues with its 737 jets. In the 1990s, design flaws in 737 rudder control systems resulted in two fatal crashes in the United States. NTSB concluded that under certain conditions, faulty rudder control units could jam, potentially causing an in-flight loss of control. On the basis of these findings, FAA ordered additional maintenance inspections and ultimately mandated the replacement of rudder control systems on all affected Boeing 737s in 2002.

Dreamliner Woes

Boeing's 787 Dreamliner, the company's most modern wide-body offering, has also faced quality concerns. Boeing has delivered more than 1,100 since the 787 first entered into service in 2011, and no fatal crashes involving this aircraft type have occurred. However, multiple whistleblowers have come forward with safety concerns about 787 assembly in South Carolina. One whistleblower made allegations of installed defective parts and said that piles of metal shavings that could damage wiring, as well as tools and other debris, were often left behind on aircraft. This whistleblower, who died by suicide in March 2024, was seeking damages through the legal system for alleged retaliation by Boeing. Another whistleblower raised concerns that processes for joining 787 fuselage sections could damage the aircraft structure and alleged that Boeing retaliated against him after he alerted FAA. That whistleblower headlined an April 2024 hearing before the Senate Permanent Subcommittee on Investigations about an alleged lax safety culture at Boeing. Boeing maintains that the whistleblower's concerns had already been voluntarily disclosed to FAA and corrective actions were taken, and it has contested his allegations of retaliation. The whistleblower cases parallel FAA findings of multiple 787 quality control issues and possible falsification of records.

Increased Scrutiny of Boeing

Following the January 2024 Alaska Airlines mishap, FAA halted any expansion of Boeing 737 Max production, capping it at the existing post-grounding, post-pandemic level of 38 deliveries per month, shy of its 50 per month target. FAA said it will not lift the cap until Boeing implements a comprehensive action plan to (1) improve SMS and employee safety reporting programs, (2) simplify work processes and instructions, (3) enhance supplier oversight, (4) improve employee training and communication, and (5) increase internal audits. In May 2024, Boeing released an action plan outlining immediate steps to improve its production systems and supply chain quality oversight. However, FAA's ability to effectively monitor and evaluate these changes remains in question. An October 2024 Department of Transportation Office of Inspector General (DOT OIG) audit found that FAA's oversight processes for identifying and rectifying Boeing production problems were not effective. The audit asserted that FAA does not use data-driven methods to target oversight and lacks a tracking system capable of identifying systematic compliance deficiencies. The DOT OIG also found that FAA does not sufficiently review design approvals intended to ensure that aircraft components from suppliers conform to approved design specifications. It found that FAA has not assessed the effectiveness of Boeing's SMS and has not established criteria for reinstating its delegated certification functions and units.

third-quarter 2024 earnings report, Boeing stated that it has an order backlog of over 5,400 airplanes, up substantially from the backlog of about 4,300 airplanes reported in September 2022. It stated that aircraft deliveries in the first nine months of 2024 totaled 291 airplanes, compared with 371 for the same period in 2023. Boeing will likely face persistent production pressures for years to come that could pose challenges for FAA in effectively monitoring safety compliance and manufacturing quality assurance, especially as production restrictions are eased.

Further complicating FAA's role is that the supply chain of Boeing airplane component parts is highly distributed and diverse, stretching from Asia to Europe. Fuselage sections for the 787 are fabricated in Japan, South Korea, Italy, and Wichita, KS, prior to being joined during final assembly at Boeing's Charleston, SC, plant. Similarly, sections of 737 fuselages are fabricated in Wichita, KS, and shipped by rail to Renton, WA, for final assembly. Across its product lines, Boeing relies on over 700 primary suppliers as well as a network of sub-tier suppliers scattered across the world. The DOT OIG found that Boeing oversight of suppliers is limited, and this has, in some instances, allowed for the introduction of substandard parts. Measures to ensure that suppliers can produce conforming parts was a significant element of Boeing's 2015 settlement agreement, but concerns have persisted, with documented conformity failures of 787 parts.

The DOT OIG also raised concerns that FAA manufacturing inspectors focus too heavily on daytime activities and on processes they are familiar with rather than basing oversight on systematic evaluations of risk. More broadly, FAA faces continued challenges in recruiting, retaining, and training its inspector workforce. Although FAA is attempting to address these challenges through a comprehensive aviation safety workforce plan, it could continue to face hurdles in maintaining a skilled workforce and providing appropriate resources to effectively oversee complex organizations such as Boeing. As a result, FAA plans to continue to rely heavily on delegated authorities, particularly the Organization Designation Authorization (ODA) program that tasks dedicated units at companies such as Boeing to carry out certain testing, evaluation, and certification functions on FAA's behalf. The ODA program, however, came under intense scrutiny during the 2019-2020 grounding of the 737 Max. In 2022, Boeing was stripped of its delegated authority to issue airworthiness certification for completed 787 aircraft pending improvements to quality control and manufacturing processes. Similarly, after the January 2024 door-plug mishap on Alaska flight 1282, FAA restricted certain Boeing 737 ODA functions pending satisfactory implementation of comprehensive reforms. The FAA Reauthorization Act of 2024 (P.L. 118-63) mandates annual ethics training for ODA unit members and requires FAA to develop a forum for reviewing and sharing ODA best practices. Assuring trust and conducting effective oversight of delegated aircraft design and manufacturing activities at Boeing could remain a persistent challenge for FAA.

Bart Elias, Specialist in Aviation Policy

FAA's production cap and the machinists strike have squeezed Boeing's ability to meet customer demand. In its

Ongoing Challenges

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