



Committee on Transportation and Infrastructure
U.S. House of Representatives

Peter A. DeFazio
Chairman

Washington, DC 20515

Sam Graves, MO
Ranking Member

November 7, 2019

Katherine W. Dedrick, Staff Director

Paul J. Sass, Republican Staff Director

The Honorable Stephen M. Dickson
Administrator
Federal Aviation Administration
800 Independence Avenue S.W.
Washington, D.C. 20591

Dear Administrator Dickson:

As you know, our Committee has been investigating the design and development of Boeing's 737 MAX, the Federal Aviation Administration's (FAA) certification processes, and related issues. While our investigation is ongoing, we are concerned about two additional safety issues about which we have received detailed information. Both appear to involve serious, potentially catastrophic safety concerns raised by FAA technical specialists that FAA management ultimately overruled after Boeing objected. These incidents raise questions about how the agency weighs the validity of safety issues raised by its own experts compared to objections raised by the aircraft manufacturers the FAA is supposed to oversee.

Boeing 737 MAX Rudder Cable Protection from Uncontained Engine Failure

The first issue involves the adequacy of rudder cable protection on the Boeing 737 MAX from an uncontained engine failure and the possibility of severance of the cable and a potentially catastrophic loss of control.

In 2014, a manager in the FAA's Transport Airplane Directorate issued a memo to a higher official in the FAA's Aircraft Certification Service asserting that Boeing had not incorporated adequate protection into the 737 MAX rudder cable as required by 14 C.F.R. § 25.903(d)(1).¹ The memo noted Boeing's previous agreement to show compliance with the latest guidance, found in Advisory Circular 20-128A, which applied lessons learned from the 1989 United Airlines flight 232 accident near Sioux City, Iowa, in which debris from an uncontained engine failure severed hydraulic lines, resulting in a crash landing that left 112 people dead. Boeing objected to making changes to the design of the 737 MAX rudder cable, arguing that changes would be impractical and noting the

¹ FAA Transport Airplane Directorate memo to FAA Aircraft Certification Service, 3/10/14, updated 9/22/14, p. 1.

company's concern about the potential impact on "resources and program schedules."² The FAA's Transport Airplane Directorate found Boeing's position unacceptable and stated its intention to release an issue paper to Boeing "requiring they protect the rudder cable from [uncontained engine failure] per AC 20-128A."³

In 2015, the FAA drafted an issue paper, finalized in 2016, that offered Boeing a chance to establish compliance without implementing a design change.⁴ At least six FAA specialists refused to concur.⁵ Strangely, the issue paper also suggested that, based on the "excellent" service history of the different engine on the prior version of the 737, the FAA "expected" the new, larger LEAP engine would have a similarly low rate of uncontained engine failures.⁶ From an analytical perspective, that argument appears to be nonsensical since the FAA was making an unfounded conclusion about the reliability of a then-unproven new engine based on the performance of a completely different older engine. This statement, however, was not part of a showing or finding of compliance.

When concern about the issue paper was submitted to the FAA's safety review process, a panel was established to review the matter. On January 13, 2017, the panel recommended that the FAA "[i]nform Boeing there is currently insufficient information, data and coordination between the FAA and Boeing such that a determination of compliance can be made . . ."⁷ The panel also rejected Boeing's position that design changes were impractical, finding, instead, that two design changes were, in fact, practical.⁸ The panel also made clear the inappropriateness of consideration of reliability of a previously approved engine to demonstrate compliance, and that the new LEAP engine was sufficiently different from its predecessor that past performance of the older engine would not be relevant in predicting the new engine's performance.⁹ Despite these concerns the 737 MAX gained certification from the FAA two months later in March 2017.

It is our understanding that non-concurrence by FAA technical specialists is fairly infrequent and not to be taken lightly. In addition, my staff has been told that it was virtually unprecedented for six or more FAA specialists to jointly non-concur on a single issue, highlighting the gravity of their concerns regarding the rudder cable issue. Despite all of this, in June 2017, the FAA's Transport Airplane Directorate upheld the controversial issue paper.¹⁰

Lightning Protection for Boeing 787 Fuel Tanks

Our Committee has also received information and documents suggesting Boeing implemented a design change on its 787 Dreamliner lightning protection features to which multiple FAA specialists ultimately objected. In addition to the merits of the safety risks the FAA experts

² FAA Transport Airplane Directorate memo to FAA Aircraft Certification Service, 3/10/14, updated 9/22/14, p. 2.

³ FAA Transport Airplane Directorate memo to FAA Aircraft Certification Service, 3/10/14, updated 9/22/14, p. 2.

⁴ Issue Paper: Engine Rotor Burst and Rudder Mechanical Flight Control Cables, 7/24/15.

⁵ Issue Paper: Engine Rotor Burst and Rudder Mechanical Flight Control Cables, 7/24/15.

⁶ Issue Paper: Engine Rotor Burst and Rudder Mechanical Flight Control Cables, 7/24/15.

⁷ SRP Item 10 SME Panel – Findings and Recommendations to the SRP Safety Oversight Board, 1/13/17.

⁸ SRP Item 10 SME Panel – Findings and Recommendations to the SRP Safety Oversight Board, 1/13/17.

⁹ SRP Item 10 SME Panel – Findings and Recommendations to the SRP Safety Oversight Board, 1/13/17.

¹⁰ FAA Transport Airplane Directorate memo to FAA Aircraft Certification Service, 6/30/17.

raised, it is also of great concern that Boeing reportedly produced approximately 40 airplanes prior to the FAA's approval of the design change. If accurate, that is an astonishing fact that suggests either willful neglect of the Federal aviation regulatory structure or an oversight system in need of desperate repair.

The change involves the removal of copper foil from zone 3 of the wing of the 787 Dreamliner, which could result in significantly higher conducted currents in that zone as well as increase the number of ignition sources in the fuel tanks. It appears FAA specialists believed Boeing's design change failed to comply with Special Condition 25-414-SC, which requires Boeing to show that a fuel tank ignition would be extremely improbable.

Lightning strikes on aircraft are a fairly routine occurrence. This is true of the 787 Dreamliner, an aircraft built of more than 50 percent carbon fiber composites. "While incredibly lightweight and strong, such aircraft composites are not inherently conductive, thus requiring additional protective coatings to mitigate lightning strike damage," according to a technical blog post on lightning protection measures.¹¹ Two years ago, a British Airways Boeing 787 was struck by lightning shortly after it departed London's Heathrow airport. When the aircraft landed in Chennai, India, it was discovered the aircraft had more than 40 holes in the fuselage from the lightning strike.¹² Three years earlier, in October 2014, a United Airlines Boeing 787 was struck by lightning leaving London's Heathrow airport en route to Houston, Texas.¹³

On February 22, 2019, the FAA's Boeing Aviation Safety Oversight Office (BASOO) formally rejected Boeing's lightning protection design change.¹⁴ Apparently, Boeing appealed the decision, and a meeting was held on February 27, 2019, during which a Boeing official reportedly stated that Boeing employees had discussed the issue with the FAA's Associate Administrator for Aviation Safety. On March 1, 2019, FAA management reversed course, and accepted Boeing's position.¹⁵

It is our understanding that the FAA has recently tasked Boeing with performing a "numerical risk assessment of the fuel tank explosion risk from lightening related ignition sources that addresses each Model 787 configuration that is determined to exist to date."¹⁶ The FAA apparently plans to use this assessment "to determine if any corrective actions to reduce the risk of a fuel tank explosion should be required by airworthiness directive action."¹⁷

¹¹ Jennifer Segui, "Protecting Aircraft Composites from Lightning Strike Damage," COMSOL Blog, June 11, 2015, accessed here: <https://www.comsol.com/blogs/protecting-aircraft-composites-from-lightning-strike-damage/>

¹² "Boeing 787 Grounded for a Week after Lightning Strike," August 5, 2017, Air Insight, accessed here: <https://airinsight.com/boeing-787-grounded-week-lightning-strike/>

¹³ Brett Macdonald, "Why Superior Lightning Strike Protection Is Vital In Aerospace," June 14, 2018, Dexmet Corporation, accessed here: <https://www.dexmet.com/blog/why-superior-lightning-strike-protection-is-vital-in-aerospace>

¹⁴ Feb. 22, 2019 letter from FAA BASOO to Boeing Organization Designation Authorization, p. 3.

¹⁵ Mar. 1, 2019 letter from FAA BASOO to Boeing Organization Designation Authorization.

¹⁶ Oct. 15, 2019 letter from FAA Seattle Aircraft Certification Office Branch to Boeing Organization Designation Authorization, p. 2.

¹⁷ Oct. 15, 2019 letter from FAA Seattle Aircraft Certification Office Branch to Boeing Organization Designation Authorization, p. 2.

While we appreciate that the FAA is finally taking some action on this issue, we are deeply concerned that the agency is just now asking Boeing to provide analysis to enable the FAA “to determine if any corrective actions” are required. It appears Boeing took actions that may have violated FAA requirements in the first place by taking unilateral steps to change the design of the aircraft’s lightning protection system. Asking Boeing to now review its own work in the aftermath of those events, if true, to help the FAA determine what corrective actions Boeing may need to take seems woefully inadequate to ensure the safety of the flying public. In addition, this process will take several months, and we would like to know how the FAA is satisfied that the risk is sufficiently low that these 787s can continue flying in revenue service before the numerical risk assessment is completed.

The two cases above regarding the 737 MAX and the 787 Dreamliner suggest that the opinions and expert advice of the FAA’s safety and technical experts are being circumvented or sidelined while the interests of Boeing are being elevated by FAA senior management. There may be reasonable explanations for FAA management overriding the decisions of its own technical experts at the behest of the manufacturer it regulates, but we would like a clear accounting of those explanations in the two instances described above.

We respectfully request that you please provide:

- 1) A detailed explanation of how the FAA decided to overrule its own safety specialists with regard to the two safety issues described above, including the process FAA relied upon to make those determinations and who at FAA made those ultimate decisions. In addition, please describe what the FAA is doing to ensure that these two issues do not pose a risk to the flying public.
 - 2) An explanation of what the FAA is doing to ensure that manufacturers do not have an incentive to attempt end-runs around FAA technical specialists by going to senior FAA management.
 - 3) A list of all lightning protection-related regulations, requirements, or standards applicable to the 787 aircraft certification at the time Boeing produced such aircraft before FAA-approval of the Boeing design change, and a description of FAA actions taken in response to any deviations of those regulations, requirements, or standards by Boeing.
 - 4) An explanation of the FAA’s conclusion that the 787s produced in response to the design change are safe to operate in revenue service before Boeing completes its numerical risk assessment of the overall fuel tank explosion risk from lightning related ignition sources, and before the FAA has had an opportunity to evaluate that assessment.
-

The Hon. Stephen M. Dickson
November 7, 2019
Page 5

Please respond to this request by November 21, 2019. Thank you for your prompt assistance in this matter.

Sincerely,



PETER A. DeFAZIO
Chair



RICK LARSEN
Chair
Subcommittee on Aviation

cc: The Honorable Sam Graves, Ranking Member
Committee on Transportation & Infrastructure

The Honorable Garret Graves, Ranking Member
Subcommittee on Aviation