



FAA

Report AV2023037
June 21, 2023

Regulatory Gaps and Lack of Consensus Hindered FAA's Progress in Certifying Advanced Air Mobility Aircraft, and Challenges Remain



Regulatory Gaps and Lack of Consensus Hindered FAA's Progress in Certifying Advanced Air Mobility Aircraft, and Challenges Remain

Requested by the Ranking Members of the U.S. House Committee on Transportation and Infrastructure and its Subcommittee on Aviation

Federal Aviation Administration | AV2023037 | June 21, 2023

What We Looked At

Advanced Air Mobility (AAM) is a Government and industry initiative to develop an air transportation system between and within rural and urban locations. This new technology, including highly automated hybrid and electric vertical takeoff and landing (eVTOL) aircraft, promises many benefits. However, the Federal Aviation Administration's (FAA) regulations are still primarily intended for traditional small aircraft, creating challenges for FAA. Given these challenges, the Ranking Members of the House Committee on Transportation and Infrastructure and its Subcommittee on Aviation requested this audit. Our objective was to determine FAA's progress in establishing the basis for certification of AAM aircraft, including ensuring the safety of novel features and providing guidance to applicants.

What We Found

Regulatory, management, and communication issues hindered FAA's progress in certifying AAM aircraft, and challenges remain. Given their unique features, AAM aircraft do not fully fit into FAA's existing airworthiness standards. For over 4 years, FAA made limited progress in determining which certification path to use. One issue is that, over 2 decades ago, FAA defined an aircraft category called powered-lift that is applicable to some AAM aircraft. However, FAA never established corresponding airworthiness standards and operational regulations, leading to significant internal debates and a lack of consensus on how to proceed. This lack of consensus affected rulemaking efforts that hindered the Agency's progress. Further, FAA changed its certification path, which caught industry by surprise. The Agency will likely continue to face challenges as it progresses through the certification process for AAM aircraft, including reviewing novel features and establishing new operational regulations. Finally, FAA has not sufficiently established policies and procedures for its Center for Emerging Concepts and Innovation, or communicated about its role in AAM certification. Continued ineffective coordination and communication, as well as the lack of timely decision making and established policies, could further hinder progress.

Our Recommendations

FAA concurred with our four recommendations to enhance FAA's regulatory efforts and communication regarding the AAM aircraft certification process. We consider all recommendations resolved but open pending completion of planned actions.

Contents


Memorandum	1
Background	3
Results in Brief	5
Regulatory, Management, and Communication Issues Hindered FAA's Progress in Certifying AAM Aircraft, and Challenges Remain	6
Conclusion	20
Recommendations	20
Agency Comments and OIG Response	21
Actions Required	21
Exhibit A. Scope and Methodology	22
Exhibit B. Organizations Visited or Contacted	24
Exhibit C. List of Acronyms	26
Exhibit D. Major Contributors to This Report	27
Appendix A. Agency Comments	28
Appendix B. Nongovernmental Organization Responses	30



Memorandum

Date: June 21, 2023

Subject: ACTION: Regulatory Gaps and Lack of Consensus Hindered FAA's Progress in Certifying Advanced Air Mobility Aircraft, and Challenges Remain | Report No. AV2023037

From: Nelda Z. Smith 
Assistant Inspector General for Aviation Audits

To: Federal Aviation Administrator

In recent years, interest in Urban Air Mobility (UAM)—the use of highly automated or autonomous aircraft to transport passengers or cargo within urban areas—has grown significantly as a result of factors such as increasing urban congestion. UAM is a subset of Advanced Air Mobility (AAM), which is part of a National Aeronautics and Space Administration (NASA), Federal Aviation Administration (FAA), and industry initiative to develop an air transportation system between rural and urban locations. This new technology, including hybrid and electric vertical takeoff and landing (eVTOL) aircraft, promises many benefits, such as reduced commuting times, and may introduce entirely new methods of intra- and inter-city transportation.

Industry has developed and begun to test a wide variety of aircraft, and FAA is currently reviewing applications to certify AAM aircraft using existing Federal Aviation Regulations. However, since existing regulations are still primarily intended for traditional small aircraft, these unique vehicles have created challenges for FAA. AAM aircraft design and operating capabilities can vary significantly and include novel technology and systems, such as using electric engines or a hydrogen fuel cell system, requiring the establishment of new airworthiness requirements and additional scrutiny during the certification process. Further, while initial certification applicants feature a pilot on-board, the goal of many companies is to eventually operate fully autonomous aircraft.

Given the challenges surrounding the certification of AAM aircraft, the Ranking Members¹ of the House Committee on Transportation and Infrastructure and its Subcommittee on Aviation requested that we assess FAA's processes to apply existing regulations and guidance to this novel technology. Specifically, they asked us to examine: FAA's plans for applying existing airworthiness standards, how FAA intends to ensure the design safety of novel features, and FAA's efforts to ensure clarity and consistency in guidance for certification applicants while retaining sufficient flexibility to account for novel features. Accordingly, our audit objective was to determine FAA's progress in establishing the basis for certification of AAM² aircraft, including ensuring the safety of novel features and providing guidance to applicants.

We conducted this audit in accordance with generally accepted Government auditing standards. Exhibit A details our scope and methodology. Exhibit B lists the organizations we visited or contacted, and exhibit C lists the acronyms used in this report.

We appreciate the courtesies and cooperation of Department of Transportation representatives during this audit. If you have any questions concerning this report, please contact me or Robin Koch, Program Director.

cc: The Secretary
 DOT Audit Liaison, M-1
 FAA Audit Liaison, AAE-100

¹ On August 4, 2020, Ranking Member Sam Graves of the U.S. House Committee on Transportation and Infrastructure and Ranking Member Garret Graves of the Subcommittee on Aviation requested this audit.

² While the Congressional request used the term *Urban Air Mobility* (UAM), the request also refers to use of eVTOL aircraft to link small towns with urban centers and multimodal transportation hubs. As these applications are broader than UAM, we will use the term Advanced Air Mobility (AAM) throughout this report to reflect the larger industry.

Background

The AAM projects currently undergoing FAA certification are aircraft that can take off and land vertically and have capacity for one to four passengers. Proposed AAM operations could include ferrying passengers through urban areas faster and more efficiently than cars or providing on-demand cargo services at logistics hubs. In addition, the AAM aircraft operations proposed by many manufacturers and stakeholders include use cases which may help increase access to underserved communities, such as transporting medical supplies to facilities in rural areas.

These use cases can potentially advance the DOT's innovation principles, including focusing innovation efforts to serve key public policy priorities, such as advancing equitable access to transportation. The White House Office of Science and Technology Policy emphasized at its August 2022 Summit on AAM the opportunity to "create a world...where innovative electric vertical takeoff and landing aircraft can shorten commute times...." The White House also noted its commitment "to ensuring the United States remains the global leader in aviation and other emerging transportation technologies that have the potential to bring tremendous benefits to all American people."

The typical process of certifying any new aircraft (including a new type design) begins when an applicant submits a type certificate application. FAA's Aircraft Certification Service staff in 1 of 10 Aircraft Certification Offices (ACO) typically review these applications. Applicants whose projects have significant innovative technologies also receive assistance from FAA's Policy and Innovation Division, through its Center for Emerging Concepts and Innovation (CECI)—a new specialized office within FAA's Aircraft Certification Service, along with the applicable ACO. This is the division typically involved with initial certification activities for AAM aircraft as well as other innovative vehicles, such as unmanned aircraft systems (UAS, also known as drones).

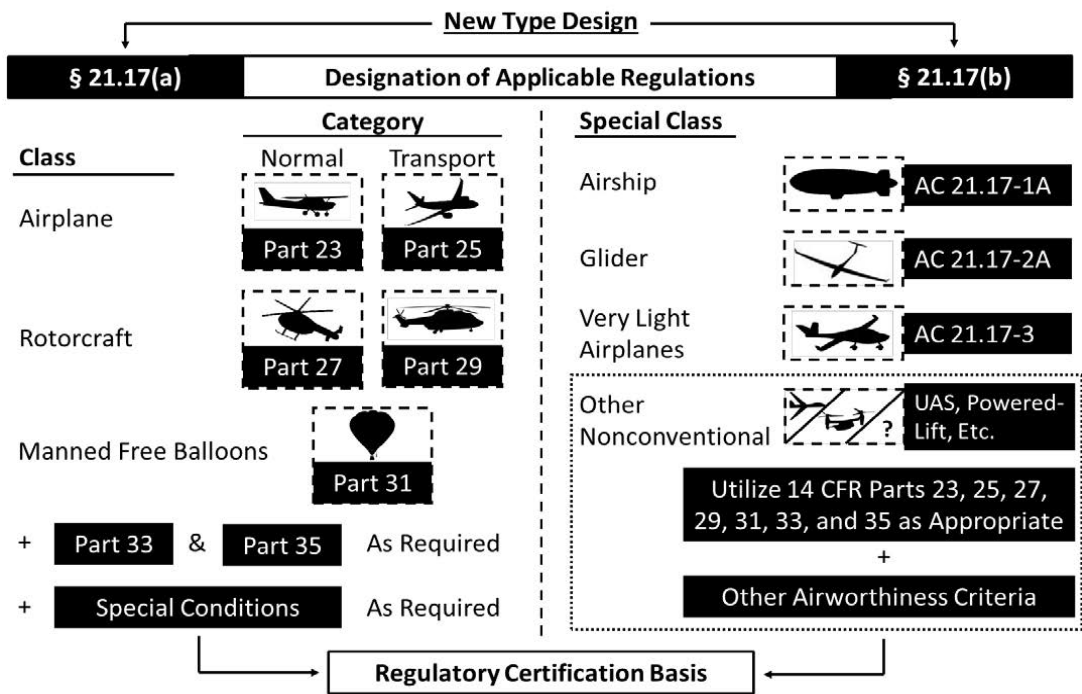
FAA has two potential certification processes to use in certifying a new design depending on whether the proposed aircraft type is covered in current definitions and airworthiness standards. FAA's existing certification regulations include three aircraft classes—airplanes, rotorcraft (e.g., helicopters), and balloons³—each with their own set of rules, operating characteristics, and airworthiness standards.⁴ If

³ 14 CFR Part 1 defines an airplane as an engine-driven fixed-wing aircraft heavier than air that is supported in flight by the dynamic reaction of the air against its wings, a rotorcraft as a heavier-than-air aircraft that depends principally for its support in flight on the lift generated by one or more rotors, and a balloon as a lighter-than-air aircraft that is not engine driven, and that sustains flight through the use of either gas buoyancy or an airborne heater.

⁴ Airworthiness standards are outlined in 14 CFR Parts 23 and 25 (Normal and Transport Category Airplanes), 14 CFR Parts 27 and 29 (Normal and Transport Category Rotorcraft), and 14 CFR Part 31 (Manned Free Balloons).

the proposed new aircraft design meets one of these three classes and existing aircraft definitions, FAA uses the process in 14 CFR § 21.17(a) to designate the applicable standards as the certification basis⁵ (e.g., a normal category airplane or rotorcraft, as well as its engines and/or propellers⁶ as required) and adds special conditions as needed for novel features that the regulations do not cover. This process or certification path is typical for a traditional airplane or rotorcraft (see figure 1).

Figure 1. FAA Certification Path Decision Tree



Source: FAA

However, as shown in figure 1, if the proposed new aircraft design does not fit into existing definitions and corresponding airworthiness standards, FAA uses the 14 CFR § 21.17(b) path to designate it as a special class aircraft. FAA can then apply regulatory standards from any and all applicable classes, (e.g., airplane, rotorcraft, or balloons) to form the certification basis. There are no individual special conditions, as the whole project is considered a special class, and FAA must publish the entire airworthiness criteria in the Federal Register for public

⁵ The initial certification basis specifies the applicable regulations and special conditions to which the project must comply. The FAA document that establishes the agreed upon certification standards and criteria between FAA and the applicant is referred to as the G-1 Certification Basis Issue Paper.

⁶ Airworthiness Standards for Aircraft Engines are contained in 14 CFR Part 33, Propellers in 14 CFR Part 35.

comment. FAA uses this certification path for nonconventional aircraft, such as gliders, UAS, and powered-lift⁷.

After FAA establishes the certification basis, the Agency develops the corresponding means of compliance⁸ for how the aircraft will meet the established regulatory basis. An applicant has either 3 or 5 years⁹ after filing an application to complete the certification process, depending on the aircraft class and category. FAA can award a type certificate once the applicant has demonstrated the new aircraft model complies with all applicable airworthiness regulations. After FAA issues the type certificate, the applicant can then obtain other approvals¹⁰ necessary for aircraft production and operations.

Results in Brief

Regulatory, management, and communication issues hindered FAA's progress in certifying AAM aircraft, and challenges remain.

Given their unique features, AAM aircraft do not fully fit into FAA's existing airworthiness standards, and for over 4 years, FAA made limited progress in determining which certification path to use for AAM aircraft. One issue that impacted FAA decision-making and the certification process centered on the fact that, over 2 decades ago, FAA defined an aircraft category called powered-lift that is applicable to some AAM aircraft with fixed wings. However, FAA never established corresponding airworthiness standards and operational regulations, leading to significant internal debates on how to proceed with AAM certification for aircraft that met the definition of powered-lift, including conflicting regulatory interpretations. FAA had difficulty reaching internal consensus on a path to certify fixed-wing, powered-lift AAM aircraft, leading to impacts on rulemaking efforts

⁷ 14 CFR §1.1: Powered-lift means a heavier-than-air aircraft capable of vertical takeoff, vertical landing, and low speed flight that depends principally on engine-driven lift devices or engine thrust for lift during these flight regimes and on nonrotating airfoil(s) for lift during horizontal flight.

⁸ The means of compliance (contained in the G-2 Issue Paper) are details about which mechanisms, tests, etc. the company will use to demonstrate its project meets those regulations, standards, and airworthiness criteria agreed upon in first stage of the certification process (G-1).

⁹ 14 CFR § 21.17(c) states "An application for a type certification of a transport category aircraft is effective for 5 years and an application for any other type certificate is effective for 3 years, unless an applicant shows at the time of application that the product requires a longer period of time for design, development, and testing, and the FAA approves a longer period."

¹⁰ 14 CFR Part 21 Subpart G Production Certificates; 14 CFR § 21.183 Issue of standard airworthiness certificates for normal, utility, acrobatic, commuter, and transport category aircraft; manned free balloons; and special classes of aircraft; and 14 CFR Part 119 – Certification: Air Carriers and Commercial Operators. Under these regulations, an applicant can obtain the other needed approvals, such as production and airworthiness certificates, as well as operating certification.

that hindered the Agency's progress. These disagreements reflected larger management challenges within the Agency regarding how to safely certify these new innovations within FAA's current regulatory framework. Ultimately, after several personnel changes at the most senior FAA executive levels, the Agency reversed its position to address AAM integration into the National Airspace System beyond just aircraft certification, including pilot certification and operations. In April 2022, FAA communicated to applicants that the Agency would certify fixed-wing AAM as powered-lift, special-class aircraft. This change caught industry by surprise because FAA executives had previously communicated the Agency's plan to certify fixed-wing, powered-lift AAM aircraft as airplanes for several years. Although FAA has now selected an overall certification path, the Agency will likely continue to face challenges as it progresses through the certification process for individual AAM aircraft, including reviewing novel features and establishing new operational regulations. For example, revising regulations remains a significant challenge for advancing AAM. FAA is currently working on a rulemaking for powered-lift operational and training requirements, and the Agency expects to issue the final rule in 2024. Further, FAA has not sufficiently established policies and procedures for its Center for Emerging Concepts and Innovation, or communicated about its role in AAM certification within the Agency or externally to applicants. Continued ineffective coordination and communication, as well as the lack of timely decision making and established policies, could further hinder progress as the AAM industry grows and new aircraft types emerge.

We made recommendations to enhance FAA's regulatory efforts and communication regarding the AAM aircraft certification process.

Regulatory, Management, and Communication Issues Hindered FAA's Progress in Certifying AAM Aircraft, and Challenges Remain

A number of regulatory, management, and communication issues have impacted FAA's progress in determining the certification path for AAM aircraft. For example, FAA defined a new powered-lift category over two decades ago that can also apply to certain AAM aircraft, but did not establish corresponding regulations and airworthiness standards. Further, for over 4 years between 2018 and 2022, FAA encountered difficulties deciding on the regulatory path the Agency would use to establish the certification basis for AAM aircraft due in part to a lack of consensus within FAA. These disagreements contributed to delays in Agency rulemaking efforts and, as a result, hindered FAA's AAM aircraft certification process. While FAA has since determined the overall path, many

unresolved issues remain, including finalizing rulemaking efforts, addressing communication shortcomings, acquiring and maintaining adequate staffing resources and expertise, clarifying and communicating roles and responsibilities, and resolving operational challenges.

Regulatory Gaps Impacted FAA's Progress in Determining the AAM Certification Path

While FAA has begun the process of certifying six AAM aircraft, the aircraft have unique features that do not fully fit into FAA's existing airworthiness standards. In addition, FAA defined a new aircraft class over two decades ago that can also apply to certain AAM aircraft, but never followed through with establishing regulations.

AAM Aircraft Have Unique Features That Do Not Fully Fit Into FAA's Existing Regulatory Framework

As of August 2022, FAA was engaged in the aircraft certification process with six AAM companies that have formally applied for certification.¹¹ While these are all considered AAM eVTOL projects, each aircraft model has unique features, both compared to traditional small aircraft as well as to each other. For example, some aircraft, as shown in figure 2, have designs similar to rotorcraft (e.g., helicopters), except that they fly using multiple rotor systems, as opposed to a single, main rotor found with traditional helicopters. Other aircraft fly using a fixed wing, but may use propellers or multiple distributed rotors to assist with lift, complemented by electric engines. Additionally, some of these aircraft fly via electric battery propulsion or a combination of batteries and a hybrid electric-diesel engine rather than traditional internal combustion engines. Many of these aircraft have additional novel features, such as hydrogen fuel cells or highly automated flight control systems.

¹¹ Air VEV, Alakai Technologies, Archer Aviation, Beta Technologies, Joby Aviation, and Moog, Inc.

Figure 2. AAM Aircraft in the FAA Certification Process as of August 2022



Source: UAM Manufacturers (clockwise from top-left: Alakai Technologies; AirVEV; Courtesy of Joby Aviation. © Joby Aero, Inc.; Beta Technologies; Archer Aviation; and Moog, Inc.)

FAA is using its existing aircraft certification processes and regulations to develop the certification basis for each AAM applicant. However, in part as a result of gaps in the existing regulatory framework, FAA experienced difficulties deciding between two potential certification paths for powered-lift AAM—either the typical § 21.17(a) path, or as a special class aircraft under § 21.17(b).

To help encourage innovation, the Agency enacted new regulations for normal category airplanes in 2017¹² that are performance-based and less prescriptive. Additionally, some FAA representatives told us these regulations were intended to allow for the flexibility to introduce new aircraft like AAM into the normal airplane category. For example, the final rule stated that the revised standards will facilitate the adoption of new and innovative technology and that the Agency planned to shift unique airplanes from § 21.17(b) to part 23. However, the rule also states that unique airplanes that more closely resemble rotorcraft “may be treated differently,” and other FAA representatives we interviewed believed that fixed-wing, powered-lift aircraft should remain a special class under § 21.17(b). FAA told us during our review that the Agency has completed 67 certification projects using these amended regulations, including components like an electric

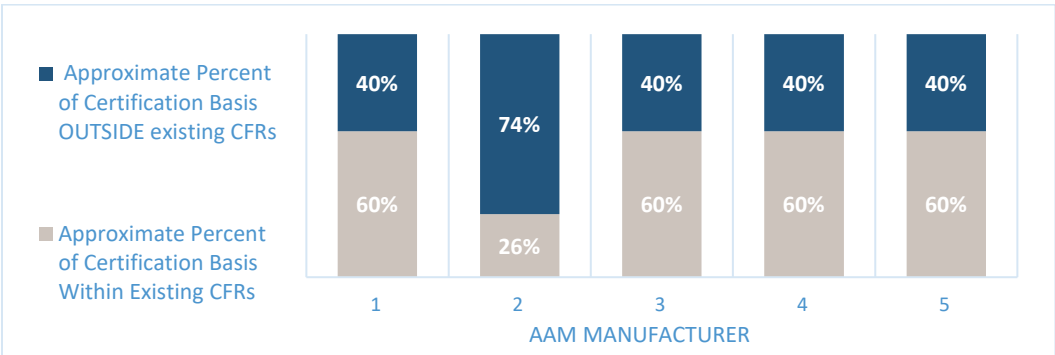
¹² Revision of Airworthiness Standards for Normal, Utility, Acrobatic, and Commuter Category Airplanes, 81 Fed. Reg. 96689 (December 30, 2016).

engine, a composite propeller, and avionics software, as well as one full, new aircraft type certification. However, the new aircraft certified under these revised standards was not an eVTOL or AAM vehicle, but rather a traditional small airplane.

Although FAA established these new regulations for the normal airplane category, the Agency lacks performance-based regulations for rotorcraft. While some AAM models more closely resemble and meet the definition of a rotorcraft, FAA is certifying them under § 21.17(b) as a special class aircraft because the rotorcraft airworthiness standards are still too prescriptive. According to FAA and company representatives, it would be too difficult to certify these aircraft under the existing rotorcraft category, even with the use of special conditions. For example, current regulations require rotorcraft to meet specific airworthiness standards related to fuel tanks, which are not applicable to an AAM powered by liquid hydrogen.

In addition, while the Agency states it is able to process these new AAM aircraft using its current policies and procedures, doing so presents challenges related to new technologies and components. According to FAA analysis from April 2022, between approximately 40 and 74 percent of the certification basis applicable to five¹³ of the current applicants could not have been developed from existing regulations, and would have needed special conditions for components such as electric engines and flight controls (figure 3). Even under the special class designation, the Agency will still have to develop standards and means of compliance that apply to these novel technologies and components for each AAM being certified.

Figure 3. Certification Basis and Existing Regulations for Small Airplanes



Source: FAA data

¹³ FAA performed this analysis on the five active AAM aircraft applications whose certification process is led by CECL.

FAA Defined a New Powered-Lift Category Over Two Decades Ago but Did Not Establish Corresponding Regulations

FAA added a new aircraft definition in the 1990s but did not follow through on establishing airworthiness standards and operational regulations, which contributed to difficulties the Agency encountered in deciding on the appropriate certification path for AAM aircraft. In 1997, FAA added an aircraft definition called powered-lift indicating an aircraft capable of vertical takeoff, vertical landing, and low speed flight that depends principally on engines during those phases of flight, and on wings during horizontal flight. Aircraft meeting this definition can have features of both airplanes and rotorcraft, like the fixed-wing, powered-lift AAM aircraft currently going through FAA's certification process.

At that time, FAA also amended the pilot certification regulations¹⁴ to establish a powered-lift aircraft category rating for pilot certification. FAA made these additions in anticipation of the certification and production of a civil aviation powered-lift aircraft, at that time powered by a traditional internal combustion engine. According to FAA, the proposed first civilian aircraft project classified as powered-lift began in the 1990s and is now called the AW-609, similar to the V-22 Osprey military aircraft (see figure 4). However, as of November 2022, FAA has not yet certified any powered-lift aircraft.¹⁵

Figure 4. Original Powered-Lift VTOL Civilian and Military Aircraft



Sources: Leonardo Helicopters (helicopters.leonardo.com); US DoD (media.defense.gov)

The lack of fully defined regulations has created regulatory hurdles for the Agency and manufacturers seeking to operate AAM in the National Airspace System (NAS). For example, current FAA regulations do not allow powered-lift aircraft to operate as “air carriers,” meaning they cannot transport passengers or cargo for commercial purposes. Further, according to FAA, currently there is no

¹⁴ 14 CFR §61.5(b)(1) Certificates and ratings issued under this part – Aircraft category ratings.

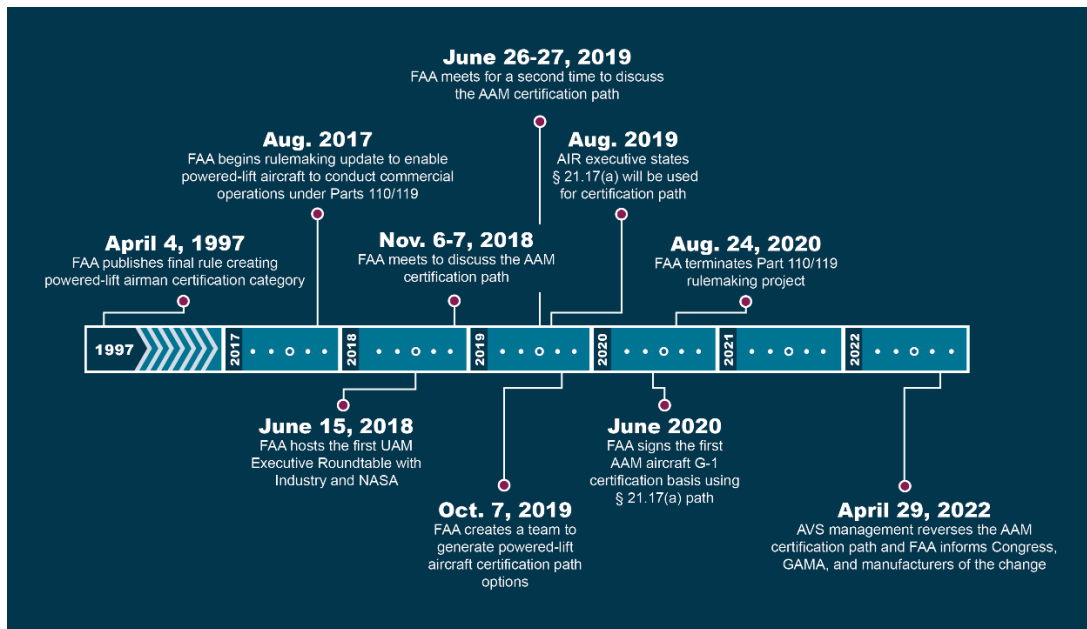
¹⁵ According to the Agency, this powered-lift aircraft project (AW-609) is still in the certification process after applicant-related delays stemming from company ownership changes and other external factors.

way for a civilian pilot to attain a powered-lift category pilot certificate under the existing rules. This is because the powered-lift pilot type rating standards—also written in the 1990s—require aircraft-specific flight experience. For example, the pilot rating requires 40 hours of actual or simulated instrument time, and at least 10 hours of cross-country flight time in a powered-lift aircraft. However, that is presently almost impossible to obtain, because no civilian powered-lift aircraft has yet to receive FAA certification.

Lack of Consensus on the AAM Certification Path Hindered Progress Over an Extended Time

As a result of regulatory gaps, management and FAA personnel struggled to reach consensus on a certification path for AAM aircraft for the last 4 years due to varying interpretations of how to apply existing aircraft definitions. Compounding this disagreement were employee concerns over management’s insistence on a specific categorization for certain AAM aircraft. These disagreements led to an impasse impacting the development of operational requirements that FAA did not resolve until spring 2022. Figure 5 shows a timeline of key AAM decision points and events within the Agency.

Figure 5. Timeline of Key AAM Certification Decision Points



Legend: AIR = Aircraft Certification Service; AVS = Aviation Safety; GAMA = General Aviation Manufacturers Association; NASA = National Aeronautics and Space Administration

Source: OIG analysis of FAA and manufacturer data

FAA did not make its final determination on the certification path for fixed-wing AAM for an extended time because staff within the Agency did not agree on how to certify these aircraft under FAA's regulations. There were differing positions within FAA on the path for certification of fixed-wing AAM aircraft.

- **§21.17(a) position.** Certain employees within FAA, including former FAA executive leaders, supported pursuing § 21.17(a) for fixed-wing AAM aircraft, concluding that it would be both easier and the more appropriate path. According to FAA representatives we interviewed, proponents of the § 21.17(a) path believed this to be the best option because:
 - the Agency lacked certification and operational regulations for powered-lift aircraft;
 - FAA's new performance-based regulations under Part 23, Amendment 64 were intended to help accommodate innovative, new aircraft designs and technologies; and
 - proposed AAM fly a majority of the time like airplanes, and unique features could be covered by special conditions.

In addition, industry applicants and a group representing AAM manufacturers supported certification as airplanes under § 21.17(a), due in part to their concerns with a lack of operational regulations for powered-lift aircraft. As a result, industry viewed § 21.17(a) as the best, most expeditious path to certification and ultimately operation. For example, when one manufacturer first applied formally for certification of its new proposed aircraft design in 2018, company representatives believed the Agency could certify the aircraft as an airplane under the regulations for normal category airplanes, using special conditions to address the unique and novel features. This was because the company's vehicle mostly operated as a fixed-wing airplane—even though it had vertical take-off and landing capabilities like a rotorcraft—and because of those new, less prescriptive, performance-based regulations.

- **§21.17(b) position.** While some within FAA had agreed on the path to certify AAM aircraft as airplanes starting in 2019 and communicated that externally, other Agency staff we interviewed, including managers and technical and legal staff, continued to have reservations. For example, 7 of 10 FAA employees we asked expressed frustration with what they perceived as leadership's insistence in certifying fixed-wing AAMs as airplanes. Certain employees at the time stated that the aircraft being considered a fixed-wing style AAM "truly meet the definition of powered-lift" and that that § 21.17(b) "special class" be used for certification.

Despite these disagreements and concerns, FAA initiated a rulemaking project in 2021 to remove the powered-lift definition from regulations. FAA viewed this as the best way to move forward with certifying fixed-wing style AAM aircraft under the normal airplane category. According to our interviews, this decision and internal disagreements contributed to a decline in morale among some staff, and the rulemaking effort ran into an impasse in late 2021, stalling progress for several months.

These disagreements reflected larger management challenges within the Agency regarding how to incorporate innovation into the existing regulatory structure. They also reflected ongoing issues within FAA regarding employee morale and management communication. During the same timeframe, results of employee surveys in both Aircraft Certification and Flight Standards Services demonstrated additional employee concerns with their leadership's information sharing and objectivity, both broadly and specific to this issue. For example:

- The 2019 Employee Viewpoint Survey of Aircraft Certification Service's Policy and Innovation Division¹⁶ showed that over 50 percent of respondents were not satisfied with the information they received from management about what was going on in their organization.¹⁷
- Within Flight Standards Service, Office of Aviation Safety Standards, a December 2021 Management Assessment report¹⁸ disclosed that many respondents felt that upper management interjected "personal bias to the point where it contradicted the SME [subject matter expert] work, expertise and experience." This concern was raised specifically about the AAM certification process as well as other topics. It also concluded that "elevating issues up the chain of command can be problematic for reasons such as intimidation by higher management or fear of a decision being preordained."

These issues and internal disagreements impacted timeliness, proposed regulations, and policy decisions on AAM certification and operation. Specifically, these disagreements delayed Agency rulemaking efforts aimed at filling in regulatory gaps related to powered-lift and AAM certification, and as a result

¹⁶ This office was responsible for developing the certification basis for five of the six AAM certification projects.

¹⁷ FAA officials noted that this survey was conducted during the same timeframe as the Boeing 737 MAX accident investigations, which they believe also affected morale across the Agency.

¹⁸ This Management Assessment Report dated December 8, 2021 was volume 1 of 10 assessments conducted by SAIC Safety Analytical and Technical Support Services (SATSS) on the FAA Flight Standards Office of Aviation Safety Standards (OSS). The document states it is "all-inclusive, interviewing all available managers from all levels of OSS management." The primary focus was to evaluate the state of organizational health at all organizational levels, assessing four domains of culture and performance: leadership, communication, accountability, and performance management.

hindered the overall certification process. Moreover, similar issues could lead to further delays as FAA progresses with advancing AAM certification.

FAA Made a Decision on the AAM Certification Path, but Significant Work Remains

Ultimately, in April 2022 after moves of several significant Agency executives, FAA decided the Agency will certify fixed-wing style AAM as a special class, or powered-lift aircraft, reversing course on its prior position to certify them as airplanes with special conditions. According to the Agency, this shift was part of an effort to address safe AAM integration into the NAS, beyond just aircraft certification, to include pilot certification and operations. Although FAA has now determined a path forward on this issue, significant work remains. This includes:

Undertaking rulemaking efforts. Rulemaking and revising regulations remains a significant challenge for advancing AAM. In early 2022, FAA initiated a rulemaking team to create a Special Federal Aviation Regulation (SFAR)¹⁹ that would establish revised eligibility requirements to enable the approval of an initial group of powered-lift pilots. It will also determine which operating rules to apply to powered-lift aircraft since the existing general and commercial operating regulations do not specifically include powered-lift, and this—according to FAA—creates a safety gap. While the Agency has made a statement saying they “remain on track...to have the operational framework (including the SFAR) in place in 2024,” FAA has not yet issued any rulemaking documents related to the SFAR. According to FAA, the SFAR Notice of Proposed Rulemaking (NPRM) is expected to be published in Spring 2023, with the final rule expected at the end of 2024.

FAA is also restarting revisions to other commercial operations regulations (Parts 110 and 119)²⁰ to include powered-lift, so that those aircraft can obtain certificates for commercial operation. In 2017, the Agency started a rulemaking project updating the regulations²¹ to allow powered-lift aircraft to perform commercial operations. However, FAA terminated the proposed rule in August 2021 because executives wanted to look at removing powered-lift instead. According to FAA technical staff, this proposed rule—if issued—would have streamlined AAM operational approvals, and this delay caused the Agency to be

¹⁹ A SFAR is typically a temporary rule to address a temporary situation. It is a rule and not an exemption, deviation, or authorization.

²⁰ 14 CFR Parts 110 and 119 provide the requirements for certification and operation as an air carrier for compensation, including as a commercial operator.

²¹ Currently, the air carrier definitions and applicability sections in parts 110 and 119 do not include powered-lift, and as such FAA needs to publish rulemaking in order to include powered-lift in those sections.

further behind in the process to enable the eventual commercial operation of these aircraft. On November 21, 2022, FAA signed a NPRM to add powered-lift to the regulatory definitions of certain air carrier and commercial operations, and it was published to the Federal Register²² on December 7, 2022.

Addressing communication shortcomings. Initially, the AAM industry believed that FAA would certify AAM aircraft that fly the majority of the time like airplanes under § 21.17(a), due to several factors. One reason was that from 2018 until early 2022, FAA executive leadership communicated their support for certifying fixed-wing style AAM aircraft as airplanes using the § 21.17(a) path, even though there were ongoing internal FAA discussions on the topic. For example, according to industry and FAA representatives, the Agency made public statements to the AAM community during roundtables in 2019 and 2020 that FAA would certify these aircraft as Part 23 airplanes. Further, FAA had also already approved one of the applicant's certification basis as a normal category airplane using the § 21.17(a) path in June 2020, which was reported publicly.

The April 2022 shift to now certify fixed-wing AAM aircraft as a special class, powered-lift aircraft caught industry by surprise—including the four active certification applicants directly impacted by the change. According to FAA and company representatives, the Agency communicated this information via telephone calls to stakeholders. Officials for one AAM company stated they did not receive a clear reason for the shift during a subsequent meeting with the Acting FAA Administrator, Acting Associate Administrator for Aviation Safety, and FAA Chief Counsel. As noted in a joint FAA and industry certification best practices document,²³ clear and open communication between FAA and the applicant is important for improving safety, efficiency, and effectiveness of certification. In addition, in its *Standards for Internal Control in the Federal Government*,²⁴ the Government Accountability Office (GAO) states that effective external communication is vital for an entity to achieve its objectives.

Subsequently, FAA issued public statements regarding the shift disclosing that “The agency is pursuing a predictable framework that will better accommodate the need to train and certify the pilots who will operate these novel aircraft. Our process for certifying the aircraft themselves remains unchanged [...] and the changes in our regulatory approach should not delay their projects.” However, this change still created concern among at least three of the six companies currently going through the certification process, especially those that had been

²² 87 Fed. Reg. 74995 (December 7, 2022).

²³ The Certification Process Improvement guide (CPI), set forth in a job aid titled *The FAA and Industry Guide to Product Certification* from May 2017, was a joint effort between FAA and Industry created to improve safety by fostering better communications, project management, and accountability, thereby enhancing the efficiency and effectiveness of the product certification process.

²⁴ GAO, *Standards for Internal Control in the Federal Government*, GAO-14-704G, September 2014.

further along in establishing a certification basis under § 21.17(a). These concerns included:

- timing of the issuance of their FAA type certificate; and
- international harmonization for companies planning to operate in countries outside the United States.

The impact of this path shift on the timing or potential delays in completion of aircraft certification projects is not entirely clear. We found differing opinions within FAA on whether this change will add significant time to the ongoing applications, and the Agency has already taken steps to implement the new path. FAA engineers have already revised and approved the certification basis for two AAM aircraft – Joby Aviation and Archer Aviation. FAA approved both Joby’s and Archer’s certification basis as a special class aircraft under the § 21.17(b) certification path, and they were issued for public comment in November and December 2022, respectively. Further, FAA is currently revising the certification basis to § 21.17(b) for an additional two aircraft and, according to FAA engineers and company representatives, the revised certification basis under § 21.17(b) is almost identical to the original certification basis.

In addition to questions about changes to the certification basis, some AAM companies are still concerned that the rules necessary to allow for powered-lift and AAM operations will not be implemented in time to meet their aircrafts’ certification schedule. In response to these concerns, FAA is currently working to complete a related rulemaking project creating experience requirements that will enable persons to acquire a commercial pilot certificate with a powered-lift category rating and then be able to operate these aircraft once the certification process is complete. In addition, this rulemaking will identify which operational requirements apply to powered-lift. However, FAA and industry will not know the impact of these certification and priority shifts on AAM projects until the Agency completes the rulemaking work, estimated for 2024.

Further, some AAM industry representatives we interviewed are concerned that the airworthiness criteria, standards, and approvals used to certify aircraft under § 21.17(b) will not be in harmonization with other civil aviation authorities, such as the European Union Aviation Safety Agency (EASA) or the United Kingdom Civil Aviation Authority (UK CAA). While FAA has established aviation bilateral agreements with multiple international authorities to ensure coordination,²⁵ some AAM manufacturers remain concerned about the ability to obtain aircraft certification in other countries. According to one company we interviewed, this concern is due to the “powered-lift” and “special class” designations on their

²⁵ Bilateral agreements are legal contracts outlining mutual acceptance of certain aviation standards and inspections between US and foreign civil aviation authorities, with special reviews required on items of difference.

aircraft not having an equivalent designation with other international regulators, and the lack of established airworthiness standards and operational requirements for this category of aircraft in those bilateral agreements. However, FAA personnel and senior leaders we interviewed have not yet identified any harmonization issues relating to AAM certification, and stated they are currently working with international authorities to ensure coordinated integration of powered-lift into existing operations and regulations.

Sustaining adequate staffing and expertise for AAM certification. FAA is currently determining the appropriate certification basis and, in some cases, developing the corresponding means of compliance for active AAM aircraft certification projects, including reviewing novel and unique features. In addition, the Agency finalized the certification basis for a new electric engine in September 2021 that it intends to use as a template for other similar technology going forward. However, every FAA ACO working on active AAM certification projects and Aircraft Certification managers in the Policy and Innovation Division said that they will face significant challenges acquiring and maintaining adequate employee resources and subject matter expertise to process such projects as the number handled by the Agency scales up in the near future. For example, as of December 2022, only two of the six applicants have a published document²⁶ establishing the proposed certification basis for its aircraft. The other four companies are still in discussions with FAA. In addition, there are another 14 AAM companies in the “pre-application,” early engagement process with FAA’s innovation center.

Clarifying and communicating roles and responsibilities. In its Standards for Internal Controls, GAO states that management needs to obtain and communicate quality information to all levels. However, FAA has not yet published clear information or guidance on the roles and responsibilities of CECI, a relatively new office within the Aircraft Certification Service that plays a key part in the AAM certification process. In 2018, FAA started to develop this new office specifically working on emerging technology certification projects, such as AAM. This office evolved over the next 2 years, and in late 2020, the Agency officially stood up CECI as a specialized office within the Policy and Innovation Division of Aircraft Certification. According to FAA Headquarters representatives we spoke with, FAA shared information about the formation of CECI within the Aircraft Certification Service. However, according to both FAA field office personnel we interviewed and our review, the Agency did not officially communicate to other groups within FAA regarding CECI’s role in the certification process. For example, an email and newsletter that FAA sent out internally regarding CECI’s formation

²⁶ 87 Fed. Reg. 67399, *Airworthiness Criteria: Special Class Airworthiness Criteria for the Joby Aero, Inc. Model JAS4-1 Powered-Lift*. (November 8, 2022); 87 Fed. Reg. 77749, *Airworthiness Criteria: Special Class Airworthiness Criteria for the Archer Aviation Inc. Model M001 Powered-Lift*. (December 20, 2022).

in late 2018 was a general message about its inception and did not clearly explain the role it would have in AAM certification.

The Aircraft Certification Service stated in its July 2018 strategic plan²⁷ that it was creating an Innovation Center, explaining that it is an organization and process that facilitates development of new standards and guidance as well as promotes the safe and efficient adoption of emerging technology and processes for aviation applicants. However, FAA's guidance that outlines the structure of the Policy and Innovation Division²⁸ does not include CECI. In addition, while the Agency has provided general information to industry, it has not yet externally issued documentation specifying the roles and responsibilities of this new office. Moreover, the Agency's establishment of CECI coincided with a re-organization of Aircraft Certification, which contributed to employee confusion about the office's respective roles and responsibilities within the Agency.

In its Standards for Internal Controls, GAO states that management should document a unit's responsibility for process objectives and risks, and that the unit itself should then determine policies necessary to operate. However, our review found a lack of policies, guidance, and work instructions both internally and externally on how CECI operates, its place in the AAM aircraft certification process, or how it coordinates with the rest of the Aircraft Certification Service. For example, according to certain FAA managers, CECI is responsible for developing the certification basis of new AAM projects. While the Policy and Innovation Division Director issued a memo in March 2021 delegating signature authority for certification basis issue papers to the CECI Branch Manager, this memo was only directed to the Policy and Innovation Division Management Team and not to the rest of the technical staff, managers, or field offices within the Aircraft Certification Service who told us they were not clear on who has this responsibility.

For each of the active AAM certification projects, FAA will be determining where existing regulations apply to the proposed technologies and systems and which systems are not covered, for which the Agency will have to develop new airworthiness standards and criteria. Therefore, the lack of written guidance, policy, and procedures regarding CECI's role in the certification process potentially reduces consistency and could hinder Agency progress in reviewing

²⁷ *Comprehensive Strategic Plan for AIR Transformation*, First Edition, July 2018. This plan was based on FAA's *Blueprint for AIR Transformation* (March 2017)—AIR's strategic vision of its transformed state—and presented a set of 10 initiatives and supporting actions to guide the Agency's work, as well as defining expected outputs.

²⁸ *FAA Order 8100.5D Aircraft Certification Service – Organizational Structure and Functions*, effective April 14, 2021. This order describes the organizational structure of the Aircraft Certification Service (AIR) and its functions. *3.b. Policy and Innovation Division (AIR-600)*. AIR-600 is responsible for supporting aerospace innovation by developing a clear pathway to certification for all aerospace products.

and approving certification projects, especially given the expected influx of AAM applicants on the horizon.

FAA is taking steps to adapt its processes to clarify the roles and responsibilities of various offices within the Aircraft Certification Service, including CECI. For example, in 2021 FAA created an Intake Board, which now evaluates all new certification projects and then routes them to either (a) CECI Project officers or (b) local certification offices (ACOs) for application processing, depending on project characteristics such as level of innovation and readiness to start the certification process. While FAA has given some internal briefings on this new process, the Agency has not yet disseminated information about the Intake Board to external stakeholders.

Additionally, FAA started but did not follow through on an initiative to establish consistency and a communication framework for AAM certification and integration efforts across the Agency's lines of business. In March 2021, FAA established the AAM Integration Executive Council, developed a charter, and held its first meeting in April 2021. According to the charter, the Council's responsibilities include: ensuring overall safety and risk-based integration goals are being met; resolving applicant or project-specific issues that create risks for the agency's AAM integration objectives; leading the development of an AAM integration plan; and overseeing communications and outreach for AAM integration into the NAS. However, the Council has not held any formal meetings since that initial meeting in April 2021. Further, while FAA has developed a draft AAM strategic framework and asked for industry feedback, the Agency has not yet published the framework or a full integration plan. As a result, the Agency has not taken full advantage of this opportunity to potentially enhance and expedite AAM certification and integration efforts.

Identifying and resolving operational challenges. Beyond the certification, communication, and regulatory issues, FAA also has additional work remaining in AAM-related areas such as airspace management and infrastructure requirements. For example, FAA acknowledged in its 2020 Concept of Operations²⁹ that the increasing number of AAM operations may soon challenge the current capabilities of the air traffic management infrastructure and air traffic control workforce resources. The Agency also anticipates some overlap of and interaction between AAM and UAS operations in certain airspace and situations through Unmanned Traffic Management (UTM)³⁰ infrastructure. However, as we recently reported,³¹ there is currently limited infrastructure available to manage

²⁹ FAA *Concept of Operations v1.0 Urban Air Mobility (UAM)*; June 2020.

³⁰ UTM is the system to manage small UAS operations in low-altitude airspace (below 400 feet) where FAA does not provide air traffic service.

³¹ *FAA Has Made Progress on a UAS Traffic Management Framework, but Key Challenges Remain* (OIG Report No. AV2022041), September 28, 2022. OIG reports are available on our website at <http://www.oig.dot.gov>.

small UAS operations, and UTM implementation has been slow. Further, after identifying a need for guidance on the topic, FAA recently issued an engineering brief³² on the design of vertiports for aircraft with VTOL capabilities, as the Agency's previous advisory circular on the topic was more than 30 years old and was based on tiltrotor aircraft that were never used commercially. The Agency expects AAM density, frequency, and complexity of operations to be high in some cases, and that the operations will include commercial and air carrier operators, requiring certain safety levels and infrastructure requirements. However, FAA's guidance acknowledges there is limited aircraft performance data and further research is needed to understand VTOL ground operation needs, such as taxiing and parking. Because FAA is still only in the early stages of beginning to certify AAM, it will be many years until the Agency can fully identify and resolve the many remaining issues with integrating AAM into the NAS.

Conclusion

AAM is an innovative technology that can transform transportation in urban and underserved areas, but it also presents significant regulatory and certification hurdles. FAA has come to an agreement regarding the path for AAM certification and has taken steps to address certification and operational concerns through ongoing development of rulemaking and policy statements. However, the Agency will still face challenges in the certification process as a result of the novel and unique technologies incorporated into these aircraft. Further, FAA has not communicated effectively with internal personnel and industry, increasing the risk of certification and operational delays. By improving communication internally and externally, FAA can enhance and facilitate collaboration with industry to support technology evolution and integration of AAM into the NAS. This collaboration will be vital as FAA takes steps to advance AAM beyond aircraft certification into operational and air traffic integration.

Recommendations

To improve FAA's efforts to enhance FAA's regulatory efforts and communication regarding the AAM aircraft certification process, we recommend that the Federal Aviation Administrator:

1. Accelerate—to the extent possible—the current rulemaking project (SFAR) regarding powered-lift pilot eligibility requirements and operating rules

³² FAA Memorandum *Engineering Brief No.105, Vertiport Design*; (September 21, 2022).

for powered-lift aircraft, and develop and implement a plan with milestones for completion of the rulemaking which includes a process for regularly updating stakeholders on these milestones.

2. Accelerate—to the extent possible—the current rulemaking project (NPRM) that will integrate powered-lift into certain regulatory definitions, and develop and implement a plan with milestones for completion of the rulemaking which includes a process for regularly updating stakeholders on these milestones.
3. Identify the causes of the difficulties in communication and decision-making related to resolving disagreements on AAM, and develop and implement a process for better managing challenges during the deliberation process for consensus in future projects, as well as a decision-making process for when consensus cannot be reached.
4. Establish and implement policies and procedures explaining CECI's roles and responsibilities in the certification process.

Agency Comments and OIG Response

We provided FAA with our draft report on May 4, 2023, and received its formal response on June 2, 2023. FAA's response is included in its entirety as an appendix to this report. FAA concurred with all four recommendations and provided appropriate planned actions and completion dates for recommendations 3 and 4. In addition, in subsequent email correspondence, FAA provided a target action date of December 31, 2023 to provide us with an update on its actions to address recommendations 1 and 2.

Actions Required

We consider all four recommendations resolved but open pending completion of planned actions.

Exhibit A. Scope and Methodology

This performance audit was conducted between March 2022 and May 2023. We conducted this audit in accordance with generally accepted Government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objective.

Our audit objective was to determine FAA's progress in establishing the basis for certification of AAM aircraft, including ensuring the safety of novel features and providing guidance to applicants. This report is in response to a request from the Ranking Members of the House Committee on Transportation and Infrastructure and its Subcommittee on Aviation.

Our review covered the aircraft certification process for six active AAM aircraft projects. To determine FAA's progress in establishing the certification basis, including novel features and providing guidance to applicants, we analyzed Federal regulations, including applicable airworthiness standards and approval processes for aircraft certification, including new technology. We also reviewed rulemaking documents relating to AAM aircraft and powered-lift certification, commercial operational approvals, and pilot training and qualifications to gain an understanding and status of AAM regulatory initiatives. In addition, we analyzed Agency documentation, such as meeting minutes, briefing slides, correspondence, program summaries, and guidance to applicants. Further, we reviewed and analyzed certification information from AAM applicants, such as Type Certificate applications and issue papers, as well as other design artifacts shared with the Agency.

We received multiple briefings from Aircraft Certification Service representatives, including the Policy and Innovation Division and the Center for Emerging Concepts, regarding FAA's AAM aircraft certification process, as well as interaction and coordination between the Agency lines of business involved in these projects. In addition, we conducted interviews with FAA representatives and executives involved with the AAM aircraft certification basis decision across multiple lines of business, including Aircraft Certification Service, Flight Standards, and Office of the Chief Counsel. Agency personnel we interviewed had responsibilities related to establishing policy and issuing guidance, applicant intake, certification basis development, rulemaking projects, and legal review and advisement.

We also interviewed 14 FAA personnel, including ACO managers, from 4 Aircraft Certification Offices (ACOs) in Boston, Chicago, Fort Worth, and Los Angeles responsible for the six active AAM aircraft certification projects. In addition, we interviewed representatives from all six of the applicants in order to learn about their experiences going through the application and certification process with AAM aircraft, their interactions with FAA, and lessons learned so far, as well as to collect relevant certification documentation. We also held meetings with four aviation industry groups to obtain their thoughts and perspectives on AAM aircraft certification and corresponding challenges pertaining to their members and interests.

To determine which applicants to contact, we obtained a list from FAA of AAM aircraft companies undergoing certification. We discussed the list with FAA to understand the differences between companies listed as “pre-coordination” or “early engagement” and “active,” and then contacted all companies listed as “active” in the certification process. Each of the applicants was at a slightly different stage in the certification process, and—for some—the status of their certification progressed during the time of our review.

We determined there are currently two electronic data records systems used by FAA to store certification documents—SharePoint and SmartSheet. In order to assess the reliability of these systems in relation to our audit objectives, we interviewed selected Agency personnel involved in the use of those records systems as part of the certification process, and observed demonstrations of how to use those systems. We asked questions about the controls, analysis functions, and guidance and instructions for these systems in order to assess the reliability of data generated, and to validate information gathered from testimonial evidence. We observed data entry and extraction processes that Agency personnel would use as part of document management and tracking, as well as alerting functions, system security, and access controls. We also observed internal controls on data entry processes and procedures for assessing data quality. We found both of these electronic data systems to be sufficiently reliable for our audit purposes.

Exhibit B. Organizations Visited or Contacted

Federal Aviation Administration Headquarters

Aircraft Certification Service

Policy and Innovation Division

Flight Standards Service

Aircraft Evaluation Division

Aircraft Maintenance Division

Air Transportation Division

Flight Technologies Division

General Aviation and Commercial Division

Regulatory Support Division

Office of the Chief Counsel

FAA Aircraft Certification Office (ACO)

Boston ACO, Burlington, MA

Chicago ACO, Des Plaines, IL

Fort Worth ACO, Fort Worth, TX

Los Angeles ACO, Lakewood, CA

AAM Certification Applicants

Air VEV

Alaka'i Technologies

Archer Aviation

Beta Technologies

Joby Aviation

Moog Aerospace

Other Organizations

Airline Pilots Association

Aircraft Owners and Pilots Association

General Aviation Manufacturers Association

Helicopter Association International

Exhibit C. List of Acronyms

AAM	Advanced Air Mobility
ACO	Aircraft Certification Office
CECI	Center for Emerging Concepts and Innovation
DOT	Department of Transportation
EASA	European Union Aviation Safety Agency
eVTOL	Electric Vertical Takeoff and Landing
FAA	Federal Aviation Administration
GAMA	General Aviation Manufacturers Association
GAO	Government Accountability Office
NASA	National Aeronautics and Space Administration
NPRM	Notice of Proposed Rulemaking
OIG	Office of Inspector General
SFAR	Special Federal Aviation Rulemaking
UAM	Urban Air Mobility
UK CAA	United Kingdom Civil Aviation Authority
VTOL	Vertical Takeoff and Landing

Exhibit D. Major Contributors to This Report

ROBIN KOCH	PROGRAM DIRECTOR
STEFANIE MCCANS	PROJECT MANAGER
R. ANDREW FARNSWORTH	SENIOR ANALYST
RACHEL MENCIAS	SENIOR AUDITOR
MANUEL RAMOS	AUDITOR
AUDRE AZUOLAS	CHIEF COMMUNICATIONS OFFICER
ALLISON DUKAVAS	WRITER-EDITOR
SETH KAUFMAN	DEPUTY CHIEF COUNSEL
SEETHA SRINIVASAN	SENIOR COUNSEL
SHAWN SALES	SUPERVISORY VISUAL COMMUNICATIONS SPECIALIST
ANGELICA PEREZ	VISUAL COMMUNICATIONS SPECIALIST

Appendix A. Agency Comments



Federal Aviation Administration

Memorandum

Date: June 2, 2023

To: Nelda Z. Smith, Assistant Inspector General for Aviation Audits

From: Erika Vincent, Acting Director, Office of Audit and Evaluation, AAE-1 Pierre McLeod

Subject: Federal Aviation Administration Response (FAA) to Office of Inspector General (OIG) Draft Report: FAA's Progress in Certifying Advanced Air Mobility Aircraft

Digitally signed by Pierre
McLeod for Erika Vincent
for Erika Vincent, Date: 2023.06.02 14:01:04

The FAA is fully committed to carrying out rulemaking and organizational measures—some of which are already underway—to address the issues raised by OIG and improve the efficiency and clarity of the processes for advanced air mobility (AAM) aircraft certification and entry into service. By doing these steps, FAA maintains its commitment to the appropriate and necessary level of safety expected by the flying public.

The FAA offers the following comments to OIG's findings:

- The current Special Federal Aviation Regulation rulemaking project was cleared for publication on May 22, 2023, and will be published in the Federal Register¹ soon. The FAA remains committed to delivering a final rule for AAM operational requirements in 2024, prior to first expected type certification of an AAM aircraft.
- In the summer of 2022, the FAA initiated efforts to complete its multi-year re-organization of the Aviation Safety Office of Aircraft Certification Service (AIR) and finalized the re-organization in April 2023. Two significant goals of the re-organization are to improve lines of communication and clarify roles and responsibilities between the Policy office and the Compliance and Airworthiness office, particularly on new and novel technology products. This re-organization includes co-location of the former Center for Emerging Concepts and Innovation Program Integration managers with project officers of the Certification Coordination offices. This move streamlines and combines all certification engagement activities, both pre-application and during formal project execution, under one branch manager with authority to oversee the division of tasks and clean handoff of early engagement projects to the certification team at the appropriate time.
- The FAA is currently in the process of updating and publishing a work instruction to capture the early engagement process, define intake/exit criteria, and establish clear

¹ <https://www.reginfo.gov/public/Forward?SearchTarget=RegReview&textfield=2120-al72&Image61.x=0&Image61.y=0>

gateways for moving through the process. The work instruction will incorporate senior AIR leadership direction intended to clarify and distinguish the roles of AIR in enabling new technologies and guiding prospective applicants into the formal certification process at a time appropriate to them. Publication of this work instruction, anticipated for release by December 30, 2023, will serve to clearly communicate the certification path to both internal and external stakeholders.

- The FAA disagrees with OIG's characterization of internal discussions about a certification pathway for AAM/urban air mobility projects. Through this process, the FAA decided on a path that would ensure a viable operational strategy for these projects. The wide-ranging discussions did not adversely affect the applicants' programs and will better ensure a successful integration of their aircraft into the National Airspace System.

Upon review of OIG's draft report, the FAA concurs with the recommendations as written. The FAA will implement recommendations 1 and 2 through rulemaking and will publish the timelines in the unified agenda. The FAA will implement recommendations 3 and 4 by December 31, 2023.

We appreciate this opportunity to respond to the OIG draft report. Please contact Erika Vincent at Erika.vincent@faa.gov if you have any questions or require additional information.

Appendix B. Nongovernmental Organization Responses

The James M. Inhofe National Defense Authorization Act for Fiscal Year 2023³⁴ (NDAA) requires our office to inform nongovernmental organizations and business entities (NGOs) when they have been specifically identified in an OIG non-investigative report. NGOs have 30 days to review our report and may submit a written response. In accordance with the NDAA, we will notify NGOs and include their responses when applicable as required. Any claims or statements made within are wholly attributable to the NGOs alone. Any information or conclusions they may contain were not subject to Generally Accepted Government Auditing Standards nor verification by the Office of Inspector General.

³⁴ Pub. L. No. 117-263 (2022), Sec. 5274.

July 22nd, 2023

Ms. Nelda Smith
Assistant Inspector General for Aviation Audit
U. S. Department of Transportation
Office of Inspector General
1200 New Jersey Ave SE,
Washington DC 20590

RE: Department of Transportation Office of Inspector General Report AV2023037 –
Regulatory Gaps and Lack of Consensus Hindered FAA’s Progress in Certifying
Advanced Air Mobility Aircraft, and Challenges Remain

Dear Ms. Smith,

Thank you for your letter dated June 23, 2023 alerting AgustaWestland Philadelphia Corporation (“AWPC”) that a Department of Transportation Office of Inspector General (“OIG”) report, specifically “Department of Transportation Office of Inspector General Report AV2023037 – Regulatory Gaps and Lack of Consensus Hindered FAA’s Progress in Certifying Advanced Air Mobility Aircraft, and Challenges Remain” (the “Report”) identifies this company by name and discusses one of its programs. Although the AWPC aircraft model AW609 is not categorized as an Advanced Air Mobility (AAM) Aircraft, the aircraft, and its path to certification, shares similarities with the aircraft and programs described in the Report. Additionally, the Federal Aviation Administration (the “FAA”) is evaluating the AW609 for certification under 14 CFR 21.17(b) as it is for the AAM aircraft described in the Report. AWPC appreciates this opportunity to clarify and provide additional context for some representations made about the AW609 program in the Report.

The Report, on page 10, states that “the proposed first civilian aircraft project classified as powered-lift began in the 1990s and is now called the AW-609...” AWPC is extremely proud of the innovations it has developed as a part of this program, however, footnote 15 on the same page states “According to the [FAA], this powered-lift aircraft project (AW609) is still in the certification process after applicant-related delays stemming from company ownership changes and other external factors.” AWPC strongly disagrees with the FAA’s characterization of the cause of delays and asserts that many of the same factors discussed in the Report contributed to the delays to the certification of the AW609.

The AW609 program began as a joint venture between predecessors in interest to AWPC, predecessors in interest to its parent company, Leonardo S.p.A., and Bell Helicopter Textron, Inc. In November 2011, Bell Helicopter Textron, Inc. exited the joint venture and AWPC became the intended type certificate applicant. AWPC has been fully active and engaged in this project since 2012 and submitted the Type Certificate Application for this aircraft on February 15, 2012 after the ownership had changed. AWPC contends that one major contributor to the slow progress of the type certification is the FAA’s delay in fully defining the required regulations for type certification and operation of the AW609 aircraft. It took

AgustaWestland Philadelphia Corporation
3050 Red Lion Road
Philadelphia, Pennsylvania 19114
USA

Tel. +1-215-281-1400



the FAA eleven years from the date of the type certificate application to publish the G-1 Certification Basis Issue Paper, the document that establishes the agreed upon certification standards and criteria between the FAA and the applicant, for public comment. The Report discusses similar delays in issuing the G-1 Certification Basis Issue Paper for the AAM Aircraft.

Additionally, the AW609 program experienced delays due to schedule on which the FAA released the Pilot Licensing and Operational Rules. Over the course of eight years, AWPC observed the same FAA internal disagreements, constant personnel changes, and lack of decision making identified in the Report along its own path to certification. The effects of these delays and lack of direction eventually caused a series of decision changes within the FAA so that at the end of eight years, the path for Pilot Licensing and Operational Rules was the same as it had been initially determined to be.

Despite the challenges in the certification process, AWPC recognizes the extraordinary work that the FAA has carried out in tackling the complex challenges that accompany certifying the first powered-lift aircraft and continues to work hand in hand with the FAA to move toward the AW609's certification. AWPC refutes, however, the contention that ownership changes and "other external factors" contributed to the delay to certification. AWPC therefore respectfully requests that OIG take one of the following actions: (1) remove footnote 15 entirely, (2) include the additional context provided in this letter in footnote 15, or (3) include a reference to this response letter in footnote 15.

AWPC appreciates this opportunity to respond to the Report as well as the work that OIG has done to increase the efficiency and transparency of processes within the FAA. AWPC is available for any further questions that the OIG may have.

Sincerely,

Claudio Dell'Andrea
AW609 Chief Project Engineer
AgustaWestland Philadelphia Corporation

U.S. Department of Transportation
Office of Inspector General

Fraud, Waste, & Abuse

 **Hotline**

www.oig.dot.gov/hotline
hotline@oig.dot.gov
(800) 424-9071

OUR MISSION

OIG enhances DOT's programs and operations by conducting objective investigations and audits on behalf of the American public.



1200 New Jersey Ave SE
Washington, DC 20590
www.oig.dot.gov