



August 14, 2023

Christina Grabill
Federal Aviation Administration, AFS-810
800 Independence Ave, S.W.
Washington, DC 20591
Federal Aviation Administration

Subject: GAMA Comments -Integration of Powered-Lift: Pilot Certification and Operations; Miscellaneous Amendments Related to Rotorcraft and Airplanes

Dear Ms. Grabill,

Introduction

The General Aviation Manufacturers Association (GAMA) values the opportunity to provide review and comment in support of the FAA proposed *Integration of Powered-Lift: Pilot Certification and Operations; Miscellaneous Amendments Related to Rotorcraft and Airplanes (SFAR)* (docket FAA-2023-1275). GAMA represents over 150 of the world's leading general aviation airplane, rotorcraft and powered-lift developers, manufacturers, operators, service providers, repair facilities, and fixed-based operators. GAMA's general comments on behalf of our global membership are provided below.

GENERAL COMMENTS

GAMA realizes and is sensitive to the significant challenge of developing the proposed SFAR for the integration of powered-lift, recognizing the crucial role this regulation plays in establishing the initial operating environment for powered-lift aircraft. The dedication and efforts of the rulemaking team are highly valued and appreciated by the industry. GAMA members have evaluated the proposed SFAR and recognize several recommendations for the applicable regulations.

GAMA members have identified several issues that must be addressed for an effective SFAR deployment, aligned with the rulemaking objective to safely certify initial powered-lift pilots and establish temporary operating rules. The SFAR framework will enable the FAA to gather additional information and determine the most appropriate permanent rulemaking path for these aircraft. These issues are summarized briefly in this cover letter, and they are examined in detail along with additional specific comments and recommendations in the pages that follow. Consistent with GAMA's July 2022 consensus recommendations to DOT/FAA RIN 2120-AL72, we strongly urge the FAA to revise the proposed SFAR such that:

1. A powered-lift type rating is added to an existing airplane or helicopter category pilot certificate. This aligns with the path to pilot qualification for powered-lift aircraft operations under ICAO Annex 1, 2.1.1.4
2. Apply appropriate operating rules based on the performance characteristics of each aircraft type as demonstrated during type certification. This aligns with the performance-based approach to the framework for powered-lift aircraft operations in ICAO Doc. 10103 "Guidance on the Implementation of ICAO Standards and Recommended Practices for Tilt-rotors" which primarily applies rotorcraft rules to powered-lift operations except in very specific circumstances where airplane rules are applied.

As a transitional measure, the SFAR is intended to establish alternate eligibility requirements for the certification of the initial groups of powered-lift pilots to safely enable early powered-lift operations. However, the proposal currently reflects the same path for new powered-lift pilots as existing requirements for airplane and rotorcraft in which initial training and proficiency is gained by obtaining an airplane or rotorcraft category license by flying simple aircraft that do not require

General Aviation Manufacturers Association

HEADQUARTERS 1400 K Street NW, Suite 801 | Washington, DC 20005 USA | +1 202 393 1500 MAIN
EUROPEAN OFFICE Rue de la Loi 67/3 | 1040 Brussels Belgium | +32 (0) 2 550 39 00 MAIN

type rating followed by aircraft type specific training in more advanced/complex aircraft which require a type rating. This is not a practical nor appropriate transition pathway to safely certificate initial groups of powered-lift pilots. There are not yet enough powered-lift developed and in operation to even begin defining a common interface which would describe a generic “powered lift category”. For example, training toward an airplane category is conducted in a generic non-complex single-engine airplane like a Cessna 172 and not in transport category airplane like an Airbus or Boeing which require a type rating. Likewise, training toward a helicopter category is conducted in a generic non-complex single-engine helicopter like a Robinson R22 and not in a transport category Bell or Sikorsky which require a type rating. FAA recognizes that training in a generic category of initial powered-lift is not appropriate and proposes in the SFAR that all initial powered-lift aircraft will require a type rating which means all training is type specific to a particular powered-lift.

Additionally, the FAA recognizes in the SFAR that powered-lift will not be used for ab-initio pilot training programs for initial groups of powered-lift pilots by requiring that they hold an airplane or helicopter category pilot certificate with a commercial and IFR rating in order to be eligible for a powered-lift type rating. These are experienced pilots ready for type specific training and therefore there is no additional value or safety benefit to requiring them to first undergo fundamental pilot training toward a generic powered-lift category prior to pursuing a powered-lift type rating.

It is critical that the SFAR provide practical and timely pathways to pilot certification. Full alignment with ICAO Annex 1, 2.1.1.4, which allows the FAA to endorse a type rating for powered-lift aircraft on an existing airplane or helicopter pilot license, is a crucial first step in this process. As stated in the SFAR, “...the FAA has determined that, unlike airplanes and rotorcraft, it is not feasible to establish classes within the powered-lift category at this time.”

The SFAR overlooks recent advancements in flight control and simulator technologies, penalizing manufacturers who have integrated advanced flight controls by proposing a single training pathway on dual-control powered-lift aircraft. This one-size-fits-all approach could escalate safety risks. The FAA's proposal mandates manufacturers of single-control aircraft to create and maintain a separate dual-control variant or find a different model, potentially with disparate controls and performance, for pilot training. Such differences could compromise safety during training and expose pilots and instructors to unnecessary risks. Moreover, the approach does not consider the safety benefits of simulator-based training, which offers realistic scenarios without actual risk. We recommend the FAA consider closer alignment with SMS principles for the final SFAR requirements.

The proposed SFAR does not consider the actual performance capabilities and intended operations of eVTOL powered lift aircraft, potentially restricting pilot certification and aircraft operations. These concerns extend to various operational aspects, including energy reserves and pilot cross-country requirements. GAMA's recommendations aim to establish safety performance-based requirements by recognizing certified aircraft capabilities in their intended operations, enhancing safety and effectiveness.

The issues noted above flow into the Regulatory Impact Analysis (RIA), which requires a significant amount of additional information and analysis to better reflect and assess costs and benefits. The FAA should consider further examination of the cost and resource implications related to the SFAR's proposed additional powered-lift category rating and the requirement for providing 50 powered-lift flight hours to qualify each airman. Additionally, the RIA does not account for the required design, development, certification, production, maintenance, and continued operational safety monitoring of an additional fleet of certified dual-control trainer aircraft for each Original Equipment Manufacturer OEM. These costs present new burdens associated with the proposed rule. It is imperative for the FAA to recall that the

abstract for RIN 2120-AL72, as issued in the Fall 2021 Unified Agenda stated the intention to remove the powered-lift category along with its associated burdens from 14 CFR Chapter 1.

Significant concern also exists about the FAA's own resource limitations and the agency's ability to support the SFAR's framework in a timely manner, especially as it relates to pilot certification and training. The dual-control requirement will further burden already stretched FAA certification resources due to the demands of the § 21.17(b) special class certification framework for powered-lift aircraft. To ensure successful integration, it is critical that the FAA assess its own ability to allocate sufficient resources and support personnel to effectively implement the SFAR framework. This is especially important as multiple powered-lift operators are likely to target entry-into-service in similar time frames which will exacerbate any resource constraints that the agency may encounter.

Industry supports the FAA's intention to use the proposed SFAR as a bridge to permanent rulemaking and gathering data for future adjustments. However, the proposed SFAR does not include all innovative designs that will be entering the market or provide the necessary conditions to enable timely initial operations and the collection and sharing of performance data. Adoption of a pathway to performance based operational rules, such as in the ICAO Document 10103 framework as a framework for the final rule would enable operators to collect and share data about the suitability of rotorcraft operational rules for powered-lift, adjust current standards, and accommodate the diverse range of vehicle types and performance within the powered-lift category effectively. The SFAR should be re-examined by a permanent rulemaking effort as soon as practicable. GAMA members suggest that the agency re-visit the proposed SFAR and take inventory of operational data at regular intervals, such as two years, in order to make the necessary refinements based on lessons learned during initial operations.

In summary, we appreciate the opportunity to offer our comments on the Powered-Lift SFAR NPRM. Industry emphasizes the need for a pathway to global operational transferability, reasonable pathways to pilot certification, performance capability focused operational rules, and careful consideration of resource and timeline limitations. GAMA and its membership look forward to working together with the FAA to ensure regulatory certainty as we approach the final months of certification activities.

Sincerely,

David Dunning
Director of Global Innovation & Policy
General Aviation Manufacturers Association

This letter and enclosed comments are also supported by:

- Aerospace Industries Association (AIA)
- Aircraft Owners and Pilots Association (AOPA)
- Experimental Aircraft Association (EAA)
- Helicopter Association International (HAI)
- National Air Transportation Association (NATA)
- National Business Aviation Association (NBAA)
- Vertical Flight Society (VFS)

Enclosure:

Appendix A: GAMA specific comments representing consensus input provided by GAMA member companies.

DETAILED COMMENTS

GAMA's Detailed Comments represent the consensus input provided by GAMA member companies.

GAMA Comment Structure

These detailed comments are structured into four sections which address: (A) Pilot Certification, (B) Single Pilot Aircraft and Dual Controls, (C) Flight Simulation Training Devices, and (D) Operational Rules.

I. CRITICAL AREAS OF INTEREST

The four critical areas of interest are:

- A. Pilot Certification**
- B. Single Pilot Aircraft and Dual Controls**
- C. Flight Simulation Training Devices and New Training Technologies**
- D. Operational Rules**

A. Pilot Certification

Issue: The FAA is proposing a framework consistent with the existing fixed wing and rotorcraft regulations where initial training is completed in simple aircraft to obtain the underlying category certification and then advanced training is completed in more sophisticated aircraft which require type-rating. Moreover, all applicant pilots, including the FAA's Flight Standardization Board (FSB) pilots, without the underlying powered-lift airman certificate are required to log at least 50 flight hours in-category creating significant headwinds for industry stakeholders.

GAMA Recommends: A powered-lift type rating is added to an existing airplane or helicopter category pilot certificate. This aligns with the path to pilot qualification for powered-lift aircraft operations under ICAO Annex 1, 2.1.1.4. The FAA should shift emphasis away from § 61.129(e)(1) time building, prioritizing scenario-based training in a suitable Flight Simulation Training Device (FSTD) instead. The SFAR is designed as a transitional measure to facilitate the initial entry-into-service and operations of powered-lift aircraft while enabling crucial data collection and operational approvals to inform future permanent rulemaking. Such alignment with ICAO standards will significantly ease resource constraints for both the agency and industry while maintaining an equivalent level of safety. Once sufficient experience has been gathered, the FAA can reevaluate the category construct and implement permanent rules as needed.

Unprecedented burdens on industry arise as early as the FSB process. For traditional airplanes or helicopters requiring a type rating, the aircraft manufacturer submits its proposed type rating to FAA FSB members who already hold pilot certificates with the appropriate category and class. Very few, if any, FAA FSB pilots hold a powered-lift category rating at the commercial level. The burden of providing FAA pilots with no fewer than 50 powered-lift flight hours is placed on the applicant manufacturer. The likelihood of multiple powered-lift aircraft manufacturers entering the FSB process simultaneously suggests this is not a one-time concern.

The RIA fails to account for the full cost of this flight time, by only forecasting a cost of \$24,000 per type rating. This is inaccurate and does not consider the cost of time building to provide the FAA pilots with the necessary powered-lift category ratings.

The availability of training aircraft and qualified instructors will also be a significant constraint, as expected in a new aircraft certification program. Requiring a full 50 flight hours per pilot, given the varying flight endurance and resource limitations, could extend each FSB process to 6-9 months. This is particularly challenging for OEMs within and outside the United States where FSB members must travel long distances to conduct their duties. In such cases, the FAA would need sufficient resources to allow for prolonged travel to ensure proper qualification.

Industry questions the net safety benefit of § 61.129(e)(1), requirement for 50 hours in a powered-lift for which the SFAR proposes no alternate requirements. This requirement is not a training requirement, but a time-building requirement. The economic realities of operating a large powered-lift will incentivize an applicant to build this time in a lower-cost aircraft that might not be relevant to the aircraft they intend to operate commercially.

In its recent final rule, "Recognition of Pilot in Command Experience in Part 121 Air Carrier Operations," the FAA equated time spent in certain flight regimes in a military powered-lift aircraft to time in an airplane for meeting certain aeronautical experience requirements for an Airline Transport Pilot certificate. This rulemaking eliminated the previous need for military powered-lift pilots to time-build in unrelated trainer aircraft, which the FAA acknowledged as providing no safety benefit. Industry perceives a similar situation in the current context and questions the value of the FAA's time building requirements.

Considering that at least one early powered-lift will likely be a large, multi-engine turbine-powered aircraft, the mandated time building requirement raises concerns regarding its impact on the environment due to the unnecessary consumption of fossil fuels. Additionally, it generates avoidable noise impacts in the areas where this time-building would occur. GAMA and its members propose instead that the time required in a powered-lift should be linked to meeting the minimums specified in §§ 61.65(f), 61.129(e)(3), and 61.129 (e)(4), which are training-oriented requirements rather than mere time-building metrics. This approach capitalizes on the significant experience of airmen qualified through the SFAR and follows a training and competency-based approach. When combined with the requirement to pass a practical test to ATP standards, it ensures an equivalent level of safety to existing regulations.

ICAO Annex 1, 2.1.1.4, alleviates these issues, stating:

“Until 5 March 2025, the Licensing Authority has the option to endorse a type rating for powered-lift aircraft on an aeroplane or helicopter pilot license. This endorsement will indicate that the aircraft falls within the powered-lift category. To obtain this type rating, the pilot must complete an approved training course that considers their previous experience in either an aeroplane or a helicopter, as appropriate. The training will cover all relevant aspects of operating a powered-lift aircraft, ensuring pilots are well-equipped to handle the unique characteristics of this category.”

The SFAR requires candidates to hold either an Airplane or Helicopter Commercial Pilot certificate and an instrument rating. The SFAR is purpose-suited for air carrier operations, where Part 135 applicants meet or exceed § 135.243 minimums and the total aeronautical experience required by § 61.129.

An analysis of the various Airman Certification Standards reveals significant maneuver commonality between airplanes and powered lift, as well as between helicopters and powered-lift. The elevated experience level required of applicants and the direct applicability of prior experience to powered-lift operations justify credit towards § 61.129(e)(1) requirements.

GAMA agrees with the FAA's approach that accessing relief provided in the SFAR necessitates training conducted as an approved course under 14 CFR part 135, 141, or 142, ensuring standardized and regulated instruction with defined prerequisites. § 61.71 already allows the FAA to approve training courses under parts 141 and 142, where graduates are considered to have met aeronautical experience requirements. Precedent and existing regulations permit reduced hours for airman certificates compared to part 61. Considering the SFAR applies to already qualified Commercial Pilots with significant experience, these elevated prerequisites justify a competency and training-oriented curriculum, rather than an hours-based approach.

GAMA members recognize the importance of flight time in the aircraft as necessary and complementary to training. Upon completing an approved training program, we recommend the FAA accept line-oriented flight training (LOFT) in the FSTD or supervised line flying for safe initiation of operations for compensation or hire for newly rated powered-lift airmen (the FAA's current regulatory framework authorizes under § 61.71 the issuance of CPL and IR to graduates of an approved part 141 and 142 training courses). In addition to focusing on building training and competence, GAMA recommends the FAA consider aircraft takeoff and landing operations equivalent to a flight hour, as seen in precedent examples like § 61.159 (b). Applying a similar approach to meet part of the time-building requirements of § 61.129(e)(1) would be practical and consistent.

Industry commends the FAA's vision and policy initiatives that have advanced flight simulation technology, resulting in enhanced realism, better-trained airmen, environmental sustainability, reduced aircraft noise, and improved safety. The SFAR acknowledges the value of FSTD time, allowing up to 15 hours in a FSTD to count towards pilot-in-command (PIC) time. However, industry asserts that 15 hours are insufficient and will negatively impact pilot competencies due to the 50-flight hour time-building requirement in a powered-lift under § 61.129 (e)(1) and the lack of FFS credit for this requirement.

B. Single Pilot Aircraft and Dual Controls

Issue: The FAA's proposed SFAR requires some powered-lift aircraft to have a dual control variant solely for flight training purposes. In the near-term, some powered-lift aircraft models will not have alternate dual control training aircraft available for the time-building requirements. This contradicts the SFAR's intended purpose of safely enabling near-term operations while allowing for future adjustments in permanent rulemaking.

GAMA recommends: As a transitional measure, the SFAR should allow for the addition of a powered-lift type rating to existing airplane or helicopter pilot certificates in accordance with the recommendation in section A of these comments related to pilot certification. Type rating training is authorized to be conducted in high fidelity flight simulation training devices under approved courses of training in accordance with 14 CFR part 135, 141, and 142, as applicable. These approved courses should include all maneuver training in properly certified FSTDs which are qualified for training, testing, and checking of the ACS maneuvers specified in the recent IBR rulemaking (RIN 2120-AL74).

By leveraging the authorities granted in § 61.64(f), these approved training courses should conduct a portion of the practical test in the aircraft, eliminating any Pilot in Command (PIC) restrictions or supervised operating experience (SOE) requirements on the applicant's new certificate. GAMA members emphasize that following qualification, a post qualification program under part 135 should require supervised line flying in the national airspace system to codify flight experience within the qualification program.

The requirement for a dual control aircraft is directly related to the flight training requirements to achieve a powered-lift category certificate and a powered-lift instrument rating, particularly in terms of flight training in the aircraft. This poses a major barrier to entry for the several powered-lift aircraft currently under development, as they are designed with a single set of controls. These barriers are a direct consequence of FAA reversals on this rulemaking and the content of the proposed SFAR, displaying misalignment with ICAO Annex 1. A pathway exists to type-rating in an aircraft without dual controls.

The SFAR, intended as a transitional measure to facilitate entry-into-service, does not align with ICAO's Annex 1, 2.1.1.4, which allows global licensing authorities to qualify pilots for powered-lift operations without necessitating an additional category rating for powered-lift. By adding a powered-lift type rating to an existing airplane or helicopter pilot certificate, the regulatory authority can establish a pathway for initial pilot certification and operations while gathering operational data for future permanent rulemaking and the seamless integration of these transitional powered-lift pilot privileges into the permanent regulatory framework.

GAMA recommends that the FAA leverage the existing precedents (reference §§ 61.3(e)(3) and 61.159(a)(5)(ii)) and acknowledge aeronautical experience in one category aircraft as creditably similar to the experience required for powered-lift qualifications. Despite the FAA's indications in the proposed SFAR preamble, it is important to note that a dual set of controls is not necessary to issue a type rating in a powered lift, as specified by the existing rules governing practical test qualification, conduct, and limitations on a pilot certificate based on the test's procedure. Alignment with these existing rules will ensure a fair and accurate evaluation of pilot qualifications for powered-lift operations.

In regard to type rating practical tests, § 61.64 allows applicants to choose between completing the test in a simulator or in the aircraft. If the simulator option is chosen, the pilot must meet the aeronautical experience requirements in § 61.64 for the resulting type rating to not have a PIC limitation. Alternatively, pilots can opt for the aircraft-based test by completing five specific checking tasks (§ 61.64(f)(1)) or supervised operating experience (SOE) (§ 61.64(g)), which also removes the PIC limitation from the type rating.

Under § 61.64(f)(1), specific maneuvers can be checked in the aircraft, including a normal instrument landing system approach. However, if the aircraft provided is not equipped for an ILS approach or is otherwise limited, the type rating may be issued with a Visual Flight Rules (VFR) only limitation as described in § 61.63(e), as exemplified in a 2012 FAA legal interpretation to Fitch regarding a VFR-only seaplane with an ATP rating under § 61.45(b)(2). In the case of opting for the practical test in the aircraft, § 61.45 governs the required aircraft and equipment, allowing the examiner to conduct the test in an aircraft with a single set of controls if specific conditions are met.

Currently, helicopter pilots conducting part 135 on-demand VFR-only operations are not required to hold an instrument rating. The FAA should follow this model and revise proposed § 135.243(b)(1) by removing the “not limited to VFR” clause and removing § 135.243(b)(5).

The FAA can learn from the Department of Defense's approach to qualifying airplane pilots in powered-lift aircraft. The use of high-fidelity simulation, augmented flight controls, and endorsed solo flight experience has proven effective in qualifying airplane pilots to operate single-control station VTOL aircraft. The F-35B training and readiness manual, NAVMC 3500.118B, could serve as a reference point for civil powered-lift training programs.

GAMA highlights that Supervised Operating Experience (SOE) is not mandatory for obtaining a type rating, even when an aircraft is equipped with a single set of controls. According to § 61.64(f)(1), SOE is not required when the five checking points of § 61.64(f)(1) can be assessed in aircraft with single controls at the examiner's discretion (§ 61.45(e)).

The SFAR serves as a transitional measure to gather operational data and assess the suitability of single-PIC SOE in aircraft which do not have dual functioning controls. While the FAA should keep the possibility open for special cases, it does not need to grant a blanket authorization for SOE in single control aircraft. To ensure an equivalent level of safety and oversight, the industry proposes adding the phrase "except as authorized by the administrator" to relevant SOE-related regulations, creating a pathway for obtaining a Letter of Authorization (LOA). This approach serves the public interest by reducing the number of exemptions the FAA would need to handle. Alternatively, if during the FSB process, the manufacturer demonstrates operational suitability and reduced pilot skill and knowledge requirements for safe operation, pilots may be exempted from SOE or be authorized to conduct SOE virtually (as demonstrated during the COVID pandemic) or in FSTDs with scenario-based training.

In conclusion, the SFAR's requirement for a dual control variant for training aircraft presents a barrier to entry for many aircraft currently under development. This misalignment with ICAO Annex 1 and FAA reversals in rulemaking have been foundational contributors to the issue. The SFAR, designed as a transitional measure, should follow ICAO's approach in allowing pilots to add a powered-lift type rating to existing airplane or helicopter certificates without an additional category rating. Leveraging existing precedents, the FAA should acknowledge aeronautical experience from other aircraft as creditable for powered-lift qualifications.

C. Flight Simulation Training Devices and New Training Technologies

Issue: The FAA's proposed powered-lift SFAR mandates the publication of powered-lift FSTD qualification performance standards (QPS) in the Federal Register for public notice and comment, leading to significant timeline implications due to the nature of the rulemaking process. This could delay the critical path to entry-into-service beyond the initial certification of the first powered-lift aircraft which directly contradicts the intended function of the SFAR. The SFAR preamble inappropriately excludes deviation authorizations as is currently used in FSTD qualification.

GAMA Recommends: The FAA update the proposed § 194.105, to grant the Administrator the authority to designate applicable appendices from part 60 as they apply to each type of powered-lift aircraft. This would satisfy rules that speak to "the applicable QPS appendix" such as § 60.15. This update would further support utilization of existing deviation authority provided in § 60.15(c)(5), which is aligned with the National Simulator Program's current approach to working with manufacturers on evaluation of their proposed QPS.

Further, to support the introduction of new technologies, GAMA recommends amending the proposed SFAR where it references Level C simulators, to state "An FSTD acceptable to the administrator." To ensure a smooth and timely transition for powered-lift aircraft entry-into-

service, the SFAR should function as a temporary measure leading to future permanent codification of § 194.105.

GAMA and its membership have concerns regarding the current regulatory gaps in 14 CFR part 60 and its associated appendices as they relate to certifying FSTDs for aircraft other than airplanes and helicopters. Many powered-lift OEMs and their training provider partners require FSTD qualification to support pilot training, and some have already received approved deviations and proposed QPS. Due to the FAA's language in the SFAR preamble, these GAMA members now face potential regulatory risks, such as QPS notice and comment rulemaking, which were not previously considered applicable due to prior agreements and engagement with the agency. GAMA members urge the Administrator to address these concerns, harmonize the functional areas of the Agency, and find solutions to mitigate any unwarranted regulatory risks created by the new proposals.

GAMA supports the FAA's proposals in the SFAR to amend § 60.1 and recommends the inclusion of the statement, "Additional requirements for FSTD representing powered-lift are set forth in part 194 of this chapter." This amendment would effectively incorporate powered-lift category aircraft into 14 CFR part 60, including § 60.15(c)(5) deviation authorities. The proposed rule in § 194.105 is of particular importance as it outlines the applicable requirements for powered-lift FSTD qualification performance standards.

Industry contends that the authorities granted to the Administrator in this amendment make the proposed notice and comment rulemaking for each device's QPS, as stated in the SFAR preamble, unnecessary. Such additional rulemaking activities strain the agency's resources and extend timelines for aircraft entry-into-service. Should the FAA proceed with this process in the final SFAR, the RIA should be updated to reflect the associated costs and burdens, including the opportunity costs linked to delayed entry-into-service.

GAMA urges the FAA to amend its proposed SFAR to account for emerging technological advancements in FSTDs. There are many circumstances where a non-motion or a less than 6-degrees-of-freedom (6DOF) simulator may be suitable for a task that has been proposed for Level C simulation only. Innovations such as virtual and mixed reality also have the potential to provide comparable fidelity and representativeness to current simulation devices. These technologies should be fully considered for incorporation into existing training, testing, and checking paradigms.

The proposed SFAR restricts and hinders the incorporation of innovative technologies, while granting aeronautical experience credit solely to level C or higher devices. It is vital to acknowledge that new technologies, capable of matching or even surpassing fidelity and representativeness, can offer unique and complementary advantages. GAMA recommends amending the proposed SFAR where it references Level C simulators, to state "An FSTD acceptable to the Administrator." Approving the use of these devices would provide opportunities for safe, immersive training, while offering the potential to significantly reduce the hardware footprint of the flight deck and visual system, as well as the associated material cost to the operator. § 61.4(c) authorizes the FAA to approve a device other than a flight simulator or flight training device for specific purposes.

D. Operational Rules

Issue: The FAA proposed SFAR applies operational rules to powered lift primarily based on airplanes, limits the acceptability of rotorcraft rules, and does not establish a pathway for the development and

application of performance-based operational rules. This approach does not consider that many aircraft in this category have performance capabilities similar to rotorcraft. The application of prescriptive operating rules without consideration for the vehicle performance reduces the usefulness of powered-lift aircraft.

GAMA recommends: GAMA strongly recommends the agency to consider the diverse capabilities of powered-lift aircraft. This broad diversity renders the blanket application of airplane rules, as proposed in the SFAR, unsuitable for accommodating the unique design characteristics of these new aircraft. Instead, GAMA proposes applying appropriate operating rules based on the performance characteristics of each aircraft type, as demonstrated during type certification. This approach ensures safety and operational effectiveness while addressing the specific capabilities of each powered-lift aircraft. The FAA should update the SFAR to take the same approach as ICAO Document 10103 which provides guidance for the application of performance-based operating rules. To achieve this, the FAA should consider adding phrases such as "unless otherwise specified," "unless authorized by the Administrator," or "as specified per Flight Standardization Board report" to §§ 194.302, 194.303, 194.307, and 194.308.

The FAA states throughout the preamble and the RIA that the agency “conducted a comprehensive review of the operational rules, taking into consideration the anticipated capabilities of powered-lift and the lack of operational data. Each rule was evaluated to determine whether the airplane or the rotorcraft/helicopter provisions would maintain a level of safety for powered-lift operations as is provided in the current rules. Based on this review, the FAA asserts that the proposed provisions will maintain an equivalent level of safety for operations conducted in powered-lift to those conducted in airplanes, rotorcraft, or helicopters.” The FAA goes on to state that, “The FAA acknowledges that the capability of every powered-lift may not be captured or accommodated by the SFAR.”

GAMA members understand ICAO Document 10103 as an example of a performance-based approach that was developed for a large turbine-powered configuration. While the document primarily focuses on large turbine-powered tilt-rotors, it explicitly acknowledges that tilt-rotors are part of the powered-lift category. Although the manual doesn't specifically address all types of powered-lift, it foresees its use as a basis for other civil-powered lift aircraft as they mature in design. The FAA should recognize and allow operations based on the full capabilities of powered-lift to allow application of rotorcraft rules when appropriate based on aircraft performance to ensure safety and operational effectiveness. GAMA firmly believes that regulations should encompass the entire spectrum of powered-lift. This approach will facilitate safe and efficient operations for the powered-lift category.

The FSB report, type certificate data sheet, Aircraft Flight Manual, and other documents provide methods to establish appropriate operating rules. An operator's Safety Management System (SMS), operational control policies, training requirements, and other factors demonstrate their capabilities. For instance, the FAA could authorize individualized operational rules based on these factors through Operations Specifications for part 135 air carriers, LOAs for part 91 operators, and Management Specifications for part 91 subpart K fractional program managers.

To achieve this, the FAA can add "unless as otherwise specified," "unless otherwise authorized by the Administrator," or "as specified per Flight Standardization Board report" to §§ 194.302, 194.303, 194.307, and 194.308.

Failure to establish a path that enables development of performance based operational rules could create particular challenges for operators with cross-border business models. Tailoring operational rules based on each aircraft type's capability allows for safe operations and utilizes the full potential of the aircraft.

Regulations to consider for specific aircraft type's capabilities are weather minimums, minimum safe altitudes, overwater operations, and fuel reserves.

Visibility Requirements/Weather Minimums:

Powered-lift aircraft possess helicopter-like maneuverability, safe operation at low airspeeds and altitudes, and the capability of vertical takeoff and landing. Given these characteristics, the helicopter provisions of this rule should apply. The ability of helicopters to operate at lower speeds and with increased maneuverability while maintaining safety under less restrictive minima should be considered for powered-lift aircraft. Therefore, the exception incorporated in § 91.155 should allow powered-lift pilots to take advantage of their aircraft's capabilities while ensuring an equivalent level of safety¹.

§ 91.119 Minimum Safe Altitudes:

Powered-lift aircraft should comply with provisions of the rule that apply to helicopters based on their specific characteristics. The rule's basis on Civil Aviation Regulation § 60.17 and its explanatory text acknowledges the special flight characteristics of helicopters, allowing them to conduct emergency landings within limited spaces. Similarly, for powered-lift aircraft flying over congested areas below 1,000 feet above the highest obstacle, pilots should exercise due regard for potential emergency landing spots and maintain an altitude that facilitates safe emergency landings at any time. The maneuverability of powered-lift aircraft enables safe flight below the minimums required in § 60.17, provided pilots exercise good judgment and caution.

Overwater Operations:

When operating under part 135 and 136 regulations, certain powered-lift aircraft demonstrate the capability to glide in a manner similar to airplanes when carrying passengers over water. In such cases, it is imperative that the FAA applies the relevant airplane version of the rule to ensure appropriate and effective oversight. By recognizing the glide capabilities of these powered-lift aircraft, the FAA can optimize safety measures and streamline regulations accordingly. It is crucial to take full advantage of the similarities to airplane operations in these specific scenarios to maintain an equivalent level of safety for passengers and facilitate smooth and efficient operations.

Fuel Reserves:

Powered-lift aircraft, similar to helicopters, possess distinct performance capabilities that set them apart from conventional airplanes. These capabilities significantly impact their flight operations, fuel consumption, and the ability to respond to varying weather conditions and other unexpected circumstances that would drive a reserve requirement. Like helicopters, powered-lift have the capability for vertical takeoff and landing. This means they can avoid lengthy diversions often required of fixed-wing aircraft to find suitable runways in emergency or uncertain conditions, thus reducing the need for prolonged extra reserve fuel.

The ability to hover, decelerate rapidly, and maneuver at low speeds allows both helicopters and powered-lifts to safely operate in conditions of reduced visibility. With this capability, they can often land in conditions where traditional aircraft would need to divert, further justifying a reduced reserve requirement.

¹ Reference: https://archives.federalregister.gov/issue_slice/1991/9/23/48074-48089.pdf#page=15

The FAA has recognized that helicopters can safely operate with a 20-minute VFR reserve due to their performance capabilities, as compared to fixed-wing airplanes. This logically follows that a performance-based differentiation should be considered for powered-lift to maintain an equivalent level of safety².

A performance-based energy reserve concept has the same overarching objective as the prescriptive time-based reserve approach which is to ensure a safe landing. Yet while the time-based reserve is a general rule incorporated into operational planning, the performance-based concept is based on a mission-specific energy hazard assessment acceptable to the civil aviation authority. This assessment includes evaluation of performance-degrading conditions, environmental factors, and alternate landing sites, as well as aircraft-specific performance capabilities. The primary goal of the energy planning assessment is to determine potential mission points for all foreseeable energy contingencies that pose a risk of inadequate margin.

GAMA supports the acceptability of performance-based reserve frameworks that leverages mission-specific range and endurance hazard assessment, encompassing thorough mission planning, weather, air traffic, airport conditions, and other pertinent factors, where the safety objective is the assurance safe landing options. This support encompasses all aircraft types, including airplanes, helicopters and powered-lift, whether conventionally or electrically fueled. GAMA white paper “Range and Endurance Management for Battery Electric Aircraft” addresses this topic in detail.

Other Rules:

§ 194.302(n) requires powered-lift which are certified for IFR operations to comply with the airplane provisions in § 91.205(d)(3)(i). Under § 194.302(n)(1), powered-lift must be equipped with either a gyroscopic rate-of-turn indicator or a third attitude instrument system usable through flight attitudes of 360 degrees of pitch and roll installed. The proposed rule is prescriptive of a design assuming the installation of dual attitude instruments systems and/or gyroscopic rate-of-turn indicator. Advanced flight control systems may not necessarily involve those instruments. It is therefore suggested to use the same approach as for § 194.302 (y)(2)

GAMA suggests that the proposed rule in Table 1 to § 194.302 maintain a forward-looking and performance-based approach that accommodates current and future technologies particularly with respect to human-machine interface. This may be achieved by include the following text: “§ 91.205(d)(3)(i) or such airworthiness criteria as the FAA may find provide an equivalent level of safety.”

§ 194.306 and the associated amendment to § 97.1(c) propose the allowance for powered-lift aircraft pilots to use helicopter procedures as defined in § 97.3 if the aircraft is certified for instrument flight rule operations (*i.e.*, “applicability of copter procedures under part 97 of this chapter to powered lift”). The proposed inclusion of the applicability for powered-lift to participate in the instrument environment when performance and capabilities are similar to helicopters is welcomed by industry stakeholders. Powered-lift aircraft are expected to participate in the National Airspace System (NAS) in the same manner as other airplanes and helicopters and conduct operations both under visual flight rules (VFR) and IFR. The FAA leveraging the existing experience with low-altitude IFR operations to enable participation by the powered-lift aircraft segment is welcomed. GAMA looks forward to continuing to work with groups like the FAA’s Advanced Vertical Lift Team (AVLT) to expand the use of vertical flight IFR in the United States for both helicopters and powered-lift aircraft.

² For more on previous FAA positions on helicopter reserve allowances, see Federal Register / Vol. 50, No. 49 / Wednesday, March 13, 1985

In conclusion, the FAA should recognize the full capabilities of powered-lift aircraft and GAMA strongly recommends the development of regulations that allow for application of operating rules that are suitable for the aircraft's performance capabilities, including rotorcraft rules. Failure to harmonize with ICAO guidance on operational rules may create challenges for cross-border operators, emphasizing the need for a tailored approach. By acknowledging the specific characteristics of powered-lift aircraft, the FAA can optimize operational rules, such as weather minimums, minimum safe altitudes, overwater operations, and fuel reserves, to ensure safe and efficient operations within this category.