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Docket Operations, M-30
U.S. Department of Transportation
1200 New Jersey Ave, SE
Room W12-140
West Building Ground Floor
Washington, DC 20590-0001

RE: Docket No.: FAA–2023-1275; Integration of Powered-Lift: Pilot Certification and Operations; Miscellaneous Amendments Related to Rotorcraft and Airplane

The Aircraft Owners and Pilots Association (AOPA), General Aviation Manufacturers Association (GAMA), Helicopter Association International (HAI), National Air Transportation Association (NATA), National Business Aviation Association (NBAA) and Vertical Flight Society (VFS) collectively represent the diverse interests of the entire general aviation community. These organizations encompass members who are engaged in aircraft maintenance, manufacturing, ownership, operation, and pilot training. With an unwavering commitment to safety and a collaborative approach, we maintain close partnerships with the Federal Aviation Administration (FAA) to ensure the seamless integration of innovative technologies into aviation practices.

On behalf of AOPA, GAMA, HAI, NATA, NBAA, VFS, and the aviation community, we submit these comments in response to the FAA's Integration of Powered-Lift: Pilot Certification and Operations; Miscellaneous Amendments Related to Rotorcraft and Airplanes Notice of Proposed Rulemaking (NPRM). We developed these comments to share opportunities for improving the content of the proposal and to provide feedback to FAA's many questions embedded within the NPRM.

Introduction and Summary of NPRM

AOPA, GAMA, HAI, NATA, NBAA, and VFS appreciate the opportunity to comment on this rulemaking, which aims to allow for safe integration of powered-lift aircraft into the National

Airspace System (NAS). Safe and timely introduction of these aircraft is important to U.S. global leadership in aviation.

Electric vertical takeoff and landing vehicle (eVTOL) manufacturers are on track for aircraft certification and commercial operations as early as 2025. Successful completion of this rulemaking in a timely manner is critical to ensuring those entry-to-service timelines and position the U.S. as a leader in this area.

To allow for powered-lift operations, the NPRM amends certain existing regulations and proposes a new part 194, “Special Federal Aviation Regulation No. 120 – Powered Lift: Pilot Certification and Training; Operations Requirements”.

Specifically, the NPRM addresses these areas:

Certification, Training, and Qualification Requirements for Pilots and Flight Instructors

- Provides an alternate definition of cross-country time
- Establishes alternate qualification requirements for flight instructors and certain pilots, namely those who served as test pilots for the OEM
- Establishes criteria for an initial cadre of flight instructors
- De facto requires a powered-lift instrument rating

Requirements for Operating Powered-Lift

- Establishes part 91 and part 135 airplane rules as applicable to powered-lift, with some exceptions (see tables in proposed § 194.302 and § 194.303)
- Applies “suitable landing areas” definition for helicopters to powered-lift aircraft
- Allows powered-lift operations in part 136 (air tour) regulations
- Establishes flight data recorder specifications, for applicable aircraft

Maintenance, Preventive Maintenance, Rebuilding, and Alteration Requirements for Powered-Lift under Part 43 of this Chapter

- Allows for limited pilot maintenance in a remote area (§ 43.3(h))
- Requires an inspection of critical parts in accordance with the maintenance manual or ICA, or as otherwise approved by the Administrator, in lieu of compliance with § 43.15(b)

Flight Simulation Training Devices and New Training Technologies

- Requires a level C or higher FSTD for training of pilots
- Permits qualification of FSTDs of powered-lift using components of existing standards for airplanes and helicopters in part 60, appendices A through D
- Requires the publication of proposed Qualification Performance Standards (QPS) in the Federal Register for public notice and comment prior to FAA acceptance

The FAA’s Regulatory Impact Analysis (RIA) refers to a U.S. Government Accountability Office report, which stated that “many of the aircraft in this new powered-lift category could be easier to design, simpler to construct, less complicated to maneuver, quieter to fly, and more economical to operate compared to traditional aircraft.”

Meanwhile, it is the FAA’s policy to conform to the Annexes of the International Civil Aviation Organization (ICAO). The agency states in the preamble and International Compatibility that this rulemaking aligns with ICAO standards. The FAA claims in its preamble that the proposed rule would “promote competition and equity in air travel by enabling powered-lift and AAM to enter the market.”

Unfortunately, this NPRM does not empower the development of powered-lift aircraft with the potential described by the GAO. The proposal for airman qualification creates a barrier for most AAM aircraft manufacturers to enter the U.S. market and the proposed operations rules create an uneven playing field for powered-lift aircraft, failing to take advantage of the many benefits provided by vertical takeoff and landing capabilities.

Our primary concerns include:

- Misalignment with ICAO for airman certification, which
 - Creates unnecessary financial burden for many powered-lift OEMs and operators
 - Establishes impossible mandates for powered-lift with single controls
 - Unnecessarily increases costs for training and qualifying initial cadres
 - Creates a competitive disadvantage for part 141 and 142 training providers
- Failure to ensure timely approval or interim approval of simulator qualifications
- Misalignment with ICAO operational rules guidance, which
 - Does not allow for powered-lift to utilize the full capabilities of the aircraft
 - Creates international disharmonization
- Incomplete Regulatory Impact Analysis (RIA) cost data

Summary of Recommendations

Pilot Qualifications

1. Require a type rating, not a powered-lift category rating, for applicant pilots and initial cadre instructors and check pilots.
2. If the category requirement is retained, allow for simulator time to count towards aeronautical experience and training requirements.
3. Provide a pathway for simulator training to lead to a solo endorsement.
4. Leverage the FSB process in developing type rating requirements to include aeronautical experience, if determined necessary for each aircraft type.
5. Do not require an instrument rating for private pilots of powered-lift aircraft who will fly VFR only.
6. Remove the requirement for a powered-lift instrument rating when a pilot already holds an airplane or helicopter instrument rating and will not be conducting operations in IMC or under IFR, utilizing a type rating with VFR-only limitation.
7. Utilize the FSB framework in AC 120-53B to create an aeronautical experience/supervised line flying requirement to supplement type rating training if the FSB determines the aircraft's flight handling and unique characteristics demonstrate a need for such.

Simulators, Flight Training Devices, and Training Centers

1. Allow for interim approval of simulators.
2. Utilize performance-based standards proposed by the OEM to qualify simulation devices.
3. Recognize industry consensus standards for powered-lift simulators, when published.
4. Do not require part 142 training center instructors to hold a CFI or CFII.

Operational Rules

1. Consider the capabilities of powered-lift aircraft and apply ICAO Document 10103 to the assessment of operational rules.

Regulatory Impact Analysis (RIA)

1. The FAA should eliminate the powered-lift category rating requirement or include related costs, including the cost of developing, certificating, and manufacturing a dual control variant of each single control aircraft type, in the RIA.

Miscellaneous

1. Delegate determination of TAPL to the ACO, AED, or FSB assigned to a specific aircraft certification project, not to individual FSDOs.
2. Revise the proposed regulatory text regarding access to manuals to reflect modern technology and flexibility by aligning with the final rule Updating Manual Requirements to Accommodate Technology.
3. Ensure related rulemaking efforts are aligned.
4. Apply a shorter duration to the SFAR effective period or commit to revisiting on a two- or three-year cycle.

Conclusion

AOPA, GAMA, HAI, NATA, NBAA, and VFS appreciate the opportunity to provide comments to this NPRM on behalf of our members and urge the FAA to consider the recommendations outlined below in the final rule.

The U.S. will continue to be a leader in the AAM industry if the SFAR aligns more directly with ICAO standards and guidance. Manufacturers and operators in states that align closely with ICAO will have a less costly regulatory burden for airman certification while achieving the same safety goals and will better maximize the vertical capabilities and benefits of these aircraft.

Close alignment with ICAO standards and guidance will allow U.S.-based manufacturers and operators to achieve anticipated operations launch dates in 2025 and ensure a lively AAM industry in the U.S. far into the future.

Sincerely,

Aircraft Owners and Pilots Association
General Aviation Manufacturers Association
Helicopter Association International
National Air Transportation Association
National Business Aviation Association
Vertical Flight Society

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Supporting Comments

We appreciate the FAA's consideration of instrument procedures for powered-lift aircraft. Specifically, the FAA proposes to allow powered-lift aircraft that have a standard airworthiness certificate for Instrument Flight Rules (IFR) operations and meet equivalent system design and stability as helicopters as defined in appendix B in Parts 27 and 29 to utilize Part 97 copter procedures. If a powered-lift aircraft does not meet the equivalency, the Aircraft Flight Manual (AFM) would include a limitation prohibiting the use of copter procedures.

This is a practical approach to powered-lift instrument procedures, taking into account the vertical capabilities of the aircraft.

The FAA also considered the potential for powered-lift operations in remote areas and extended permissions in § 135.429(d) to allow pilots to conduct certain inspections as defined in § 43.3(h). These permissions currently apply only to helicopter operations.

We support these provisions.

Concerns

Airman Qualifications

The FAA proposes to require current airplane or helicopter pilots to add a powered-lift category rating and a type rating to an existing airman certificate in order to fly the powered-lift. The FAA also proposed to require a powered-lift instrument rating, even for aircraft not certificated for IFR or for operations not currently requiring an instrument rating.

ICAO Annex 1, 2.1.1.4 provides transition language for powered-lift airman licensing ("certificate" in the U.S.). This language permits a pilot to hold an airplane or rotorcraft category rating, then add a type-rating of a powered-lift aircraft to that certificate.

"Until 5 March 2025¹, 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." [emphasis added]

The FAA has an opportunity to better align with ICAO by applying a type rating on an airplane or helicopter certificate, utilizing existing single control cockpit designs for training and obtaining aeronautical experience, better recognizing safety benefits of simplified flight controls and taking advantage of the safety benefits realized through scenario-based simulator training.

¹ While this language is valid until March 5, 2025, ICAO has renewed this endorsement authority several times since its original issuance and is expected to continue to renew the type rating endorsement to ensure a reasonable transition period following powered-lift aircraft certification.

Type Rating with Single Control Aircraft

Not aligning with ICAO SARPs by requiring a powered-lift category rating creates an impossible requirement for aircraft with single controls. Adding a powered-lift category requires aeronautical experience - some of which must be accomplished in the aircraft - that a type rating does not.

The FAA claims in the preamble that the agency assumed manufacturers of single control aircraft would also develop a dual control version of the aircraft.

“The FAA recognizes that there are manufacturers who are currently seeking type certification of powered-lift that have only one pilot seat and a single set of controls. To comply with the proposal, the FAA expects these manufacturers to develop a version of the aircraft to contain fully functioning dual controls, which is consistent with the FAA’s expectations for flight training in airplanes and helicopters that require a type rating.”

This is an incorrect assumption, considering some of the powered-lift aircraft affected by this rulemaking were considered “airplanes”, certificating under Part 23, Small Airplanes, until May of 2022. Further, the FAA changed the Regulatory Identification Number (RIN) related to this rulemaking in 2022. Prior to that, the RIN stated the purpose of the rule was to remove “powered-lift” from Parts 61, 91, and 135.

RIN 2120-AL72 as published in the Fall 2021 Unified Agenda:

“This rulemaking would remove reference to the term powered-lift and designate applicability of current airplane operating regulations for aircraft formerly referred to as powered-lift category aircraft. This action is necessary to resolve discrepancies within the regulations, where powered-lift had been introduced in airmen regulations but not introduced for any of the associated operating regulations. This discrepancy is a barrier to the introduction of these types of aircraft into commercial service within the national airspace system (NAS). In addition, this action will also enable a path forward to airmen certification for the introduction of the first civilian twin-engine tiltrotor vertical takeoff and landing (VTOL) aircraft entering into commercial passenger carrying service.”

Manufacturers developed their aircraft certification programs and anticipated training philosophies based on this information from the FAA - airplane certification basis under Part 23 and the stated intent to remove powered-lift from airman certification and operational rules.

Now, by proposing a mandate for a powered-lift category rating, the FAA creates a mandate that is impossible to meet and for which costs are not fully considered in the RIA.

EASA is pursuing a different airman certification paradigm, as “powered-lift” is not utilized in that regulatory framework, but has signaled it intends to follow the ICAO standard and require a type rating.

In CM-FCD-001, EASA proposes requiring each applicant for a Type Certificate (TC) of VTOL-capable aircraft carry out a gap analysis, or Training Needs Analysis (TNA), to develop a customized syllabus to be approved as part of the Operational Suitability Data: Flight Crew (OSD FC). The TNA, conducted in coordination with the agency, would identify the elements of pilot type rating training and checking based on the specific characteristics of the aircraft and will be the foundation of the training syllabi.

This approach provides a tailored, practical means of qualifying airmen in these new aircraft while meeting or exceeding the FAA's proposed safety standards for certification.

Safe, Effective Training in Single Control Aircraft

The FAA asks:

- How would a flight instructor provide flight training in powered-lift with only a single set of flight controls without adversely affecting safety?

Pilots training during this transition phase would hold commercial airman certificates and presumably would have the experience required to fly Part 135 commercial operations, since Part 194 centers on commercial operations. This means a pilot would have a minimum of 500 hours of aeronautical experience (§ 135.243).

Type ratings can be achieved in simulators; dual controls, as mandated by § 91.109, are not required because training is not conducted in the aircraft. Training for a type rating can occur entirely in a Level C or above simulator (§ 61.64). The check can occur in a simulator as well, assuming the tasks defined in (§ 61.64(f)(1)) are completed in the aircraft.

Alternatively, § 61.45(e)(1) and (2) authorize testing for type ratings to be conducted in single control or single place aircraft. FAA Order 8900.1, Vol. 5, Sec. 4, provides applicable guidance, stating: "Single Controls. At the discretion of the inspector, an aircraft furnished by the applicant may have a single set of flight controls. In this situation, the inspector observes the applicant from the ground or from another aircraft."

Pilots completing a type rating must perform at the ATP level, in accordance with the Powered-Lift Type Rating and ATP Airman Certification Standards. This requirement also ensures a high standard of capabilities following type rating training.

Obtaining a type rating without flight time in the aircraft is commonplace in the industry, although we are not suggesting pilots obtain a type rating and fly innovative aircraft with no aeronautical experience. With the availability of high-fidelity Flight Simulator Training Devices (FSTDs), it is very common in today's training environment for a pilot with a private, commercial, or ATP certificate to complete type rating training and the type rating practical test in a simulator. § 61.64 authorizes this common practice.

Obtaining Aeronautical Experience in Single Control Aircraft

The FAA asks:

- How would an applicant meet the supervised operating experience requirements with a single set of flight controls in powered-lift?

§ 61.64 requires a pilot to have specific aeronautical experience, complete certain activities in the aircraft (§ 61.64(f)(1)), or complete a period of Supervised Operating Experience (SOE).

The Flight Standardization Board (FSB) process also provides opportunities for the FAA to require aeronautical experience as a post-qualification event. Supervised line flying (SLF) is

defined in AC 120-53B². Since it is a post-qualification event and not training, the newly typed pilot can act as PIC while the check pilot observes from a forward seat.

This would allow the FAA to essentially mandate aeronautical experience through the FSB process. (Note: SLF is different from SOE in § 61.64. SOE would require dual controls.)

SOE, as defined in § 61.64(g) is not necessarily a requirement if the pilot completes the five tasks outlined in § 61.64(f)(1) in the aircraft. However, SLF is one means of obtaining important operating experience in the aircraft type. Since it is a post-qualification event, it can be completed in a single control aircraft.

However, a powered-lift category add-on rating necessitates in-aircraft training, which then requires dual controls (§ 91.109).

Aeronautical knowledge requirements are consistent between airplane, helicopter, and powered-lift, as found in § 61.125. Airman Certification Standards (ACS) also indicate significant consistency between airplane and powered-lift skills and between helicopter and powered-lift skills. Noted differences between the airplane ATP/Type Rating ACS and powered-lift ATP/Type Rating ACS, for example, are vertical takeoffs and landings, hovering, hazards related to downwash and low altitude maneuvering, and effects of ring vortex state. Therefore, a “seasoned” airplane or helicopter pilot has the baseline knowledge and skills necessary to safely transition to a powered-lift aircraft with structured type rating training. Any knowledge or skills not included in the pilot’s base certificate would be included in type rating training and proficiency verified through the ACS and checking processes.

Alternatively, the FAA could authorize SOE utilizing virtual or in-aircraft observation by a check airman. The FAA authorized virtual checkrides during the COVID pandemic and provides additional guidance in the Order 8900.1 Volume 1, Chapter 3, Section 9. Some Part 135 operators and Part 142 training centers still hold authorization to conduct virtual checkrides.

Requirement for Instrument Rating

The FAA asks:

- For powered-lift that are not large aircraft or turbojet-powered, the FAA considered allowing a pilot after the two months had elapsed to continue to exercise private pilot privileges until the limitation could be removed and seeks comment on whether such relief would be appropriate.

The SFAR creates a de facto requirement for a powered-lift instrument rating. An applicant may initially seek a powered-lift category rating without a corresponding instrument rating, but proposed § 194.211(b)(3) mandates the applicant obtain an instrument-powered-lift rating and remove the “VFR only” limitation for the type rating within 2 calendar months from the month in which the applicant passes the type rating practical test.

² AC 120-53B, Guidance for Conducting and Use of Flight Standardization Board Evaluations

The FAA is proposing in § 194.211(b)(6) to allow certain private pilots to retain the “VFR only” limitation set forth in proposed § 194.211(b)(3). Specifically, a private pilot who obtains a “VFR only” type rating for a powered-lift that is less than (or equal to) 12,500 pounds, maximum certificated takeoff weight, and not turbojet-powered would not be required to remove the “VFR only” limitation within a certain timeframe.

However, the proposed regulation is inconsistent with requirements for pilots exercising the privileges of a private pilot certificate or commercial certificate, if not operating under IFR rules. These aircraft provide enhanced operational flexibility over traditional aircraft. An IFR rating is not mandatory for airplanes or helicopters and in fact many of the powered-lift aircraft will be certificated for VFR operations only. While instrument training and checking can be conducted in a VFR-only aircraft even if the aircraft is not IFR-certificated but it has instrument capabilities, a separate powered-lift instrument rating is unnecessary since many instrument skills and knowledge items are agnostic to aircraft category.

Even commercial pilots operating under 14 CFR Part 135 are not required to hold an instrument rating in certain scenarios. For example, a helicopter pilot conducting Visual Flight Rules (VFR)-only operations is not required to hold an instrument rating (see § 135.243(b)(4)). Because these aircraft have vertical takeoff and landing capabilities, we propose the FAA follow the standard established for helicopter pilots flying in VFR-only operations and not require a powered-lift type rating for these pilots, modifying proposed § 135.243(b)(1) by removing the “not limited to VFR” language.

The FAA acknowledges in Footnote 168 that an applicant holding either an instrument rating in an airplane or helicopter or an ATP certificate would appropriately mitigate any risk that may be introduced during the 2 calendar month period before the applicant removes the VFR-only limitation. We contend an instrument rating in an airplane or helicopter or an ATP certificate mitigates any risk introduced by a VFR-only limitation for any duration, not just 2 calendar months, especially as there would be no means to maintain IFR currency when operating VFR only aircraft.

The safety objective for VFR-only operations is to ensure a pilot can safely exit inadvertent Instrument Meteorological Conditions (IMC). The FAA should accept an airplane or helicopter instrument rating for VFR-limited pilots, which demonstrates the pilots have the skills needed to exit inadvertent IMC. There is clear precedent for accepting an airplane instrument rating for another category of aircraft: under current regulations, an airplane instrument rating serves as an appropriate instrument rating for glider pilots.

A type rating program would also provide a sufficient level of instrument training and proficiency in the specific aircraft type. Type rating testing is performed to the Airline Transport Pilot (ATP) Airman Certification Standards (ACS), further ensuring a pilot has enough instrument training to exit inadvertent IMC.

Innovative Human/Machine Interfaces and Simplified Flight Controls

Innovative human/machine interface designs raise questions about the benefit of applying a powered-lift category rating. Some aircraft in the mature stages of the certification process utilize very intuitive unified controls. While a typical helicopter utilizes a cyclic, collective, throttle, and anti-torque pedals, and an airplane utilizes a yoke or stick and rudder pedals, unified

controls simply use one directional control, or inceptor, and one acceleration control. There are no foot controls. Because these aircraft are easier to control, a category rating will not add a substantive safety benefit and in fact could result in negative transfer of skills between aircraft with significantly different control schemes.

For example, in one powered-lift aircraft, the left inceptor controls acceleration while the right inceptor controls altitude, attitude, and direction.

Airman certification through the type-rating, as determined by ICAO, should be tailored to the flight characteristics for each powered-lift as the aircraft may vary considerably depending on the aircraft design and the different modes in which they operate.

The FAA repeatedly points to the significant differences in the aircraft designated “powered-lift” category, which could lead one to question the value of using a category at all in these cases.

Aircraft designs with later introductions to the NAS might be semi-autonomous and use more of a “push button” interface for tasks such as takeoff, climb, cruise, hover, descent, and landing, thereby further simplifying the demands on the pilot.

Some aircraft, particularly those intended for part 91 private operations, might not require a type rating at all. In this case, the FSB would determine no type rating is necessary but would instead require manufacturer required training (MRT), mandated by the AFM and developed in accordance with AC 61-137B. § 61.31(h) gives the FAA authority to require type-specific training outside of a typical type rating.

We urge the FAA to consider an aircraft’s specific flight control interface in determining the appropriate airman qualification path.

Safety Benefits of Simulator Training

The FAA asks:

- How would a flight instructor provide flight training in powered-lift with only a single set of flight controls without adversely affecting safety?
- How would an operator fully qualify pilots for air carrier operations in an aircraft without dual flight controls while meeting the enhanced safety standard that is expected of air carrier operations?

A flight instructor would not provide flight training in a single control powered-lift aircraft. Instead, instruction would be provided in a simulator. Structured, scenario-based type rating training in a simulator provides an equal or higher safety standard than unstructured flying in an unrelated aircraft simply to build time.

Further, simulator training is widely considered to be a superior training method and industry best practice. The FAA acknowledges this in the preamble:

“The FAA has long recognized the safety advantages of flight training in FSTD. In many cases, flight simulators have proven to provide more in-depth training than can be accomplished in the aircraft. In particular, flight simulators allow training for emergency

situations, such as fire, total loss of thrust, and systems failures that cannot be safely conducted in flight. See 61 FR 34508 (July 2, 1996).”

Recommendations:

1. The FAA should align with ICAO, requiring a type rating but not a powered-lift category rating during a transition period. The FAA should also allow for airplane or helicopter instrument ratings to be applied for powered-lift aircraft, particularly for pilots not conducting instrument operations in powered-lift aircraft.
2. If the FAA requires a powered-lift category rating, the agency should provide additional credit for simulator training.
3. The FAA should provide a path for solo endorsement without requiring in-aircraft training.
4. The FAA should leverage the FSB process for developing type rating requirements, including, if necessary, aeronautical experience requirements in the form of Supervised Line Training or another activity that can be conducted with single controls.
5. The FAA should not require instrument ratings for private pilots conducting VFR operations. This exceeds long-standing regulations that allow private pilots to conduct VFR operations and not obtain an instrument rating.
6. The FAA should accept an airplane or helicopter instrument rating for commercial pilots conducting part 135 operations limited to VFR.

Initial Cadre

Requiring a powered-lift category add-on also creates unnecessary initial cadre challenges which could require the manufacturer to provide its FSB team with 50 or more hours of flight time in the aircraft. Consider the likely scenario of multiple, concurrent aircraft certification projects, unlikely to use the same powered-lift rated FAA inspectors, and the FAA is mandating industry to provide potentially dozens of inspectors with powered-lift category ratings and type ratings.

While a type rating would require the FSB team to spend a few weeks with the manufacturer to receive training, a powered-lift category add-on rating would require the FSB team to spend several months receiving training.

The FAA already has initial cadre policies that have been successful in introducing new aircraft types for years. These policies are more than adequate for powered-lift aircraft when following ICAO’s type rating requirement, rather than a powered-lift category add-on.

The costs associated - both for the FAA and for industry - with qualifying initial cadres are not accounted for in the RIA. In fact, the FAA contends the proposal removes a regulatory burden. However, the cost of the powered-lift category add-on for each pilot involved in the FSB should be accounted for, since this cost is to meet a requirement in excess of the ICAO SARPs for pilot certification and, as previously explained, in excess of previously understood FAA requirements.

Recommendations:

The FAA should remove the requirement for a powered-lift category rating and utilize existing initial cadre policies and procedures.

Training Devices and Simulator Qualifications

The FAA inaccurately presumes in its preamble that powered-lift manufacturers are not preparing to use simulator training. On the contrary, some powered-lift manufacturers are working to develop Level C or higher simulators concurrent with their aircraft design and certification projects.

Part 60, Flight Simulation Training Device (FSTD) Qualifications, does not address powered-lift simulators. Rather than publishing proposed rules for powered-lift in part 60, the FAA proposes powered-lift simulator QPS use components of existing standards for airplanes and helicopters, as outlined in Appendices A-D of part 60. Where existing standards are found to be insufficient to fully evaluate an FSTD for a special class of aircraft, such as powered-lift, the FSTD standards may be accepted by the Administrator if they provide an equivalent level of safety.

The FAA stated it would publish the proposed standards in the Federal Register for public notice and comment prior to FAA acceptance. This would essentially create a separate rulemaking process for each aircraft's simulator qualification performance standard (QPS). While this could potentially be an expedited path for initial simulator qualification by utilizing existing Appendices A-D of part 60 rather than initiating a major revision of part 60 to include powered-lift, the FAA should still consider an interim approval to ensure timely availability of simulators.

Finalized mathematical models and data packages for simulators of new aircraft types are usually not complete when the simulator is needed to begin training the early cadre of pilots and instructors. To minimize the likelihood of a gap between aircraft certification and capability to train pilots, the FAA and other CAAs often approve an "interim level C" for the qualification of FSTDs, where the initial data package is used to qualify the first devices to this level and a subsequent level D package can be approved once the aircraft validation data is available. The SFAR does not discuss this interim option, which is standard practice in the FSTD industry.

This widely used interim qualification method would provide the FAA and manufacturer the time necessary to determine the criteria required to qualify the device to the highest level.

Several international working groups, including SAE International, are developing FSTD standards for powered-lift. We recommend these be considered during qualification of powered-lift FSTDs.

The FAA's proposed rulemaking and related ACs do not take advantage of novel simulation technologies, including the use of extended reality , virtual reality or mixed reality devices. Approving use of these devices would provide opportunities for safe, immersive training. § 61.4(c) authorizes the FAA to approve a device other than a flight simulator or flight training device for specific purposes.

Recommendations:

1. The FAA should consider granting interim approval to simulators so the manufacturer can begin training.
2. The FAA should consider a public notice and comment period for the first powered-lift simulator QPS presented to the agency. After public comment and FAA acceptance, the first QPS could serve as a baseline QPS for all powered-lift simulators, just as the airplane and rotorcraft requirements in part 60 do today.
3. The FAA should utilize performance-based standards proposed by the OEM to qualify the simulation device to its highest level required to replicate and validate the aircraft as an alternate means of compliance. Airbus Industries set a precedent by proposing an alternate list of validation tests for fly-by-wire aircraft prior to the existence of any validation of the new, novel aircraft available at that time.
4. The FAA should recognize consensus standards for powered-lift FSTD, when published.

Part 141/142 Implications

The SFAR as drafted requires initial cadres be trained by the manufacturer. This eliminates the ability for part 142 Training Centers to qualify initial cadre instructors and training center evaluators (TCEs). It would also create a backlog for training.

As the industry grows, there will be a need for more instructors, yet a manufacturer may not be able to train and qualify the numbers of instructors that will be necessary. Once instructors are qualified, quite often they are hired by operators, private companies and the like. As the instructors join manufacturers, even more instructors will be needed, placing a burden on manufacturers to train in volume to scale the industry.

Part 142 training centers will need between 7-9 instructors per simulator. The SFAR requires 50 hours of time as PIC in powered-lift and 35 hours in the type of aircraft. Fifteen hours may be done in a simulator of level C or higher. This creates an unprecedented burden for TCEs training instructors, similar to the discussion in the initial cadre section above.

Normally, training center instructors do not need to hold a Certified Flight Instructor (CFI) or CFI-Instrument (I). The SFAR requires the type rating with an instrument powered lift rating as well as a CFI and CFII in type. If the aircraft is not type certificated to enable IFR operations, the CFII and the Instrument rating in the aircraft type will not be required.

Part 141 flight schools will be affected as well. The requirement for Chief Instructor and Assistant Chief Instructor along with the Designated Pilot Examiner (DPE) to acquire the 50 hours in type or combined with a simulator of level C or higher will be difficult as there are currently no powered lift aircraft to utilize for training and/or testing. Additionally, there is a significant financial burden on flight training organizations and students to find a powered-lift aircraft for training and testing toward a powered-lift rating for non-commercial use.

Recommendations:

1. The FAA should remove the requirement for a powered-lift category rating and utilize existing initial cadre policies and procedures.

2. The FAA should continue the long-time policy that training center instructors do not need to hold a CFI or CFII, so long as they hold an ATP certificate.

Operational Rules

The FAA indicates throughout the preamble that, although powered-lift aircraft capabilities are often more akin to helicopters than airplanes, without additional data, the agency will generally default to the airplane ruleset.

For example, powered-lift must follow operational rules around airplane weather minimums rather than weather minimums for helicopters, despite the capabilities of the powered-lift aircraft.

ICAO Document 10103 provides direction regarding operational rules for powered-lift aircraft.

The FAA dismissed ICAO Document 10103 in its preamble, stating:

“ICAO Document 10103, Guidance on the Implementation of ICAO Standards and Recommended Practices for Tilt-rotors, sets forth basic guidance relative to large turbine-powered tilt-rotors (a kind of powered-lift); however, this document does not address electric-powered tilt-rotors or other types of powered-lift.”

However, this is an incomplete or inaccurate representation of ICAO Document 10103. We believe the FAA should give appropriate consideration to ICAO Document 10103, as the introduction states:

“Tilt-rotors are part of the powered-lift category of aircraft. This manual does not address other aircraft within the powered-lift category such as vectored-thrust or ducted-fan. It is, however, **anticipated that this manual will be used as a basis for other civil powered-lift aircraft** as they approach design maturity.” [emphasis added]

ICAO Document 10103 is not limited in its scope to “large turbine-powered tilt-rotors” and should be used as a basis for other powered-lift aircraft.

Using ICAO Document 10103 as a basis, powered-lift aircraft would utilize helicopter fuel reserves, weather minimums and most other helicopter operational rules in parts 91, 135, and 136. However, because the aircraft are able to glide farther than rotorcraft and some are capable of high altitudes, airplane rules would apply for overwater operations and high-altitude oxygen requirements.

This is the premise behind ICAO Document 10103 - essentially considering the vertical takeoff and landing capabilities of a helicopter but the horizontal in-flight profile of an airplane.

Other National Aviation Authorities (NAAs) seem prepared to follow the concepts of ICAO Document 10103. EASA, for example, utilizes ICAO Document 10103 in consideration of rulemaking efforts related to air mobility.

The FAA’s proposal, widely adopting airplane rules for powered-lift operations, except where helicopter rules are more conservative, endangers harmonization efforts with other ICAO member states. Although many powered-lift aircraft currently in development are short-range

aircraft, it is easy to conceive of a business model using powered-lift from Seattle to Vancouver or Detroit to Windsor. The FAA's proposal sets a trap for pilots, who would be required to comply with one ruleset in the U.S. and another in Canada. Further, not all powered-lift aircraft are short-range. For example, the Leonardo AW609 can easily cross borders.

These regulations are particularly important to fully utilize powered-lift aircraft capabilities and are addressed accordingly in ICAO Document 10103:

Minimum Safe Altitudes §§ 91.119, 135.203

The FAA proposes powered-lift aircraft comply with airplane minimum safe altitudes, as defined in §§ 91.119 and 135.203, despite the fact powered-lift aircraft are capable of vertical takeoff and landing in small spaces and have helicopter-like maneuverability. The FAA is allowing powered-lift aircraft to use part 97 copter instrument procedures, recognizing the vertical capabilities of these aircraft, but then does not apply the same premise to minimum safe altitudes.

Weather Minimums §§ 91.155, 91.157, 135.205

The FAA proposes powered-lift aircraft comply with airplane VFR weather and visibility minima. The FAA makes the case for powered-lift aircraft to utilize helicopter weather minimums in the NPRM preamble, stating helicopters are afforded different weather minimums because they have the ability to operate at lower speeds with a significantly higher degree of maneuverability as airplanes, allowing a "helicopter to operate at a lower visibility and cloud clearance distance while maintaining the same degree of safety as fixed-wing aircraft flying under more restrictive minima."

In reality, many powered-lift aircraft will cruise at speeds lower than fast helicopters, such as the Bell 429, Eurocopter AS365, and many other helicopter types, yet the weather minimums for those helicopters are not increased to meet airplane minimums. Currently, weather minimums are not based only on speed but also on maneuverability.

Fuel Reserves §§ 91.151, 91.167, 135.209, 135.223

The FAA also fails to consider powered-lift aircraft characteristics and operating environment in unilaterally applying airplane fuel reserves to all powered-lift aircraft. In practical terms, fuel reserves are mandated to allow a pilot to fly to a suitable landing site in the event of unforeseen circumstances. Airplanes require longer fuel reserves because they might have to fly a farther distance to reach a suitable landing site. Helicopters are afforded the advantage of shorter fuel reserves because they are capable of landing in smaller locations.

The same is true of powered-lift aircraft, which can land in a vertical mode at the same types of locations as helicopters.

Recommendations:

1. The FAA should consider the capabilities of powered-lift aircraft and apply ICAO Document 10103 to its assessment of operational rules. This will allow for international harmonization and for aircraft to best utilize each aircraft's capabilities. Specifically:
 - a. Minimum safe altitudes mandated for helicopters should apply to powered-lift aircraft.
 - b. Weather minimums mandated for helicopters should apply to powered-lift aircraft.
 - c. Powered-lift aircraft should be permitted to utilize helicopter fuel reserves since they are capable of landing like helicopters.
2. If the FAA does not allow blanket permission for powered-lift aircraft to utilize helicopter operational rules while in vertical flight mode, the FAA should provide a pathway for an operator or manufacturer to seek approval or authorization to adopt the alternate rule. This could be achieved by simply adding, "unless otherwise approved by the Administrator" to proposed §§ 194.302, 194.303, 194.307, and 194.308.

Regulatory Impact Analysis (RIA) Inaccuracies

The FAA's RIA falls far short of actual costs to comply with this rule, particularly since the FAA proposes to require a powered-lift category rating concurrently with a type rating.

Requiring a manufacturer to develop a dual control aircraft to check the regulatory boxes of aeronautical experience for a powered-lift category add-on rating would increase the cost of this rulemaking exponentially with no demonstrated safety value over a type rating conducted in a high-fidelity Level C or higher simulator.

While the powered-lift category rating regulations are currently in effect and the FAA probably did not see the need to include costs related to a powered-lift category add-on rating in the RIA, it is a requirement being applied in an unexpected manner. As discussed above, until recently, the RIN for this rulemaking effort indicated the intent was to remove "powered-lift" from the regulations. Manufacturers of aircraft with single controls were certificated under airplane rules. ICAO's transition language, adopted by consensus of its member states and with the FAA as a participant in the ICAO working group, does not require a powered-lift category rating.

For these reasons, manufacturers and future operators had no reason to believe a powered-lift category rating would be required. Designing a dual control cockpit is not just a matter of adding an extension cord and plugging in another gaming joystick. The entire cockpit and fly-by-wire system, for those utilizing that technology, would have to be re-engineered to accommodate another set of controls. Some aircraft cockpits are not large enough to seat two people, so the front passenger seats would require redesigning to allow the rear pilot visual sight of instruments to allow tandem pilot seating or would require engineering of an entirely new cockpit.

Initial cadre costs would also be extremely high, as a manufacturer would be required to train and qualify their FSB team in the aircraft so the FSB team can then train and qualify the manufacturer's team - which just trained the FSB team. While this chicken-or-egg scenario is similar to today's initial cadre process, today's process typically does not involve providing the initial cadre with an entirely new category rating.

The powered-lift category add-on requires 50 hours of aeronautical experience. While the FAA allows, through this NPRM, for 15 hours in a simulator, the cost of the category add-on is still prohibitive. One powered-lift manufacturer estimates \$5,000 per hour for each flight hour in operational costs. That does not include the cost of person-hours for the trainee pilot or the instructor. In other words, each category add-on rating would cost upwards of \$200,000 per initial cadre pilot.

Some powered-lift aircraft will have lower operational costs, but these costs are still not considered in the RIA. The FAA's type rating cost estimate of \$22,124 is very low, even for a traditional aircraft where a simulator can be used for the entire training and checking process.

It is unclear exactly how many FAA employees hold powered-lift category ratings but it's likely 10 or fewer - not nearly enough pilots to sit on FSBs for projects occurring concurrently. Although it seems like market forces could mean manufacturers reach the FSB phase at varying times, in reality, the FSB process is so long that overlap is inevitable. Further, it's FAA policy not to allow one person to sit on multiple FSBs at the same time.

It's also likely the initial cadre training and qualification period would take several months. Meanwhile, the FAA accounts for only 10 days of training in the RIA. This is insufficient for FSB pilots to obtain both a powered-lift category add-on and a type rating.

Requiring FAA employees assigned to the FSB to obtain a powered-lift category rating will result in a considerably longer period of time in the field than obtaining a type rating, as was prescribed by ICAO.

That time also means a longer certification process for the manufacturer, resulting in opportunity costs due to much later entry into service.

Recommendation:

The FAA should eliminate the powered-lift category rating requirement or include related costs, including the cost of developing, certificating, and manufacturing a dual control variant of each single control aircraft type, in the RIA.

Additional Concerns

Technically Advanced Powered-Lift

The SFAR docket includes two draft Advisory Circulars (ACs). In the Powered Lift Operations AC, docket number FAA-2023-1275-0002_attachment_3, the FAA states:

“TAPL are powered-lift equipped with an electronically advanced system in which the pilot interfaces with a multi-computer system with increasing levels of automation in order to aviate, navigate, or communicate. Section 91.409 paragraphs (e) through (h) set forth strict and specific inspection requirements for complex aircraft systems to ensure the airworthiness of the aircraft. Powered-lift that are not considered technically

advanced as defined in this SFAR must continue to comply with § 91.409 paragraphs (a), (b), and (d) because those provisions apply to all “aircraft”...

Determining whether a display is considered a PFD [primary flight display] or an MFD [multi-function flight display] will be based on certain minimum display elements specified by the FAA...

The Flight Standards District Office (FSDO) together with the operator, will determine whether the powered-lift meets the requirements of a Technically Advance Powered Lift (TAPL). The FSDO may also work with the appropriate FAA Aircraft Certification Office (ACO) responsible for the aircraft for assistance in making that determination. As part of this process, the FAA will communicate with the operator for any specific data (e.g., instructions for continued airworthiness and aircraft manufacturer’s maintenance manuals) to substantiate the applicant’s inspection program.”

It is unusual for a FSDO to determine classification of equipment. Considering these are new aircraft straight from the manufacturers, it seems this determination should be an Aircraft Certification Offices (ACO), Aircraft Evaluation Division (AED), or FSB responsibility, particularly since FSDO personnel typically do not have this type of experience or knowledge. Delegating this authority to the FSDO could result in different operators receiving different designations regarding TAPL status for equivalently equipped aircraft.

Recommendation:

The determination of TAPL should be delegated to the ACO, AED, or FSB assigned to a specific aircraft certification project, not to individual FSDOs. This determination should be made based on the aircraft and equipment combination, not individual operator policies or procedures.

Related Rulemaking Efforts

Manual Requirements

Throughout the NPRM, the FAA indicates that pilots must maintain various manuals and documents on board the aircraft, including the AFM and MEL. However, the FAA just published a final rule in which the FAA modernized regulations requiring manuals to better reflect improvements in technology. The new language in the May 2023 final rule Updating Manual Requirements to Accommodate Technology indicates pilots should have access to information in the manuals, which accommodates electronic manuals and the possibility of remotely piloted aircraft in the future:

The certificate holder must ensure the appropriate parts of the manual are accessible to flight, ground, and maintenance personnel at all times when such personnel are performing their assigned duties.

Recommendation:

The FAA should revise the proposed regulatory text regarding access to manuals to reflect modern technology and flexibility by aligning with the final rule Updating Manual Requirements to Accommodate Technology.

Duration of SFAR

The FAA proposes a duration of 10 years for the SFAR. We recommend the agency provide flexibility to revisit the duration as rapidly advancing technologies may render some mandates inefficient or ineffective prior to the 10 year expiration. A shorter SFAR duration or a commitment to revisit the regulations will allow the regulatory framework to adapt as experience and data is available to safely implement innovative technologies.

Recommendation:

The FAA should apply a shorter duration to the SFAR effective period or commit to revisiting on a two- or three-year cycle.