Leonardo's single-engine AW119Kx features Garmin's G1000H integrated flight deck, a synthetic vision system with "Highway-In-The-Sky" depiction, a moving map and a terrain avoidance warning system. (Leonardo photo)

FAA Proposes New Part 27 Categories

The FAA's new draft Safety Continuum Policy Statement proposes reclassification of rotary-wing aircraft to facilitate the rapid certification and introduction of new technology — but falls short of expectations.

By Douglas Nelms

The FAA has issued a proposed policy statement aimed at bringing the rotary-wing world into the age of new technology. Essentially, it establishes a "safety continuum" for the certification of systems and equipment used on Normal Category Part 27 rotorcraft.

The purpose of proposed Policy Statement PS-ASW-27-TBD is to allow rapidly advancing technology to be safely and quickly certified under four distinct categories of Part 27 rotorcraft based on aircraft weight, number and type of engines (single vs. dual/piston vs. turbine), and passenger capacity. The FAA expects to issue a "Notice of Proposed Policy Statement" to be issued later this year.

Currently, Part 27 rotorcraft are defined as those with a maximum gross weight (MGW) up to 7,000 lb (3,200 kg) with a passenger capacity of nine or less. Under the proposed policy change, that single definition would be broken down as:

I Reciprocating-engine helicopter with five or fewer occupants (including crew)
II Single turbine engine, up to 4,000 lb (1,800 kg) MGW with five or fewer occupants
III Single turbine engine, 4,001 lb to 7,000 lb MGW with six or more occupants
IV Twin turbine engines

In its proposal, the FAA noted that the US rotorcraft fleet goes back more than 50 years, with the fleet containing models certified under the old Civil Aviation Regulations (CAR) 6, precursor to the current FAR Part 27. As background, the policy states:

> *Recognizing that advancements in rotorcraft systems and equipment technology have the potential to enhance rotorcraft safety, and recognizing the existence of the broad variations in the population of Part 27 rotorcraft, the FAA reevaluated the application of the standards of systems and equipment under 14 CFR §27.1309. This effort resulted in the establishment of this policy statement, which applies the FAA's safety continuum concept to the certification of Part 27 Normal Category rotorcraft systems and equipment.*

However, industry officials are indicating disappointment in the new policy proposal in that it doesn't go far enough in addressing the safety issues induced by current policy, particularly in dealing with instrument meteorological condition (IMC) and instrument flight rules (IFR) operations in single-engine helicopters.

For a link to the FAA proposal, AHS's response and additional related material, go to the AHS resource page:
www.vtol.org/se-ifr.

AHS International has noted that while the Safety Continuum approach "holds great promise for improved safety," the proposed policy statement as written essentially provides "no relief that would permit cost-effective equipage and training for IFR operations in single-engine helicopters, and thus is projected to have an insignificant impact on avoiding accidents due to flights into Inadvertent Instrument Meteorological Conditions."

"This lack of IFR-certified systems in single-engine helicopters is now considered to be a major factor in aircraft accidents."

Background

The policy statement was issued in response to a white paper issued in September 2015 by AHS International, Helicopter Association International (HAI), General Aviation Manufacturers Association (GAMA) and Aircraft Electronics Association (AEA), calling for alternatives to existing certification guidelines dating back to 1999 (see "Restoring Single Engine Helicopter IFR," *Vertiflite*, May/June 2015). Those guidelines imposed airline-level safety requirements for critical systems in rotorcraft. This, in turn, made IFR systems for single-engine rotorcraft too heavy and expensive to be practical. As a result, IFR certified single-engine rotorcraft are virtually non-existent in today's single-engine helicopter fleet.

This lack of IFR-certified systems in single-engine helicopters is now considered to be a major factor in aircraft accidents. The paper cited 194 single-engine helicopter accidents during the 2001–2013 time period caused by inadvertent IMC (IIMC) flights or controlled flight into terrain (CFIT) due to low-level flight to avoid weather. None of the aircraft involved in those accidents were certified for IFR. They were all limited by certification to visual flight rules (VFR)-only, which essentially requires the pilot to maintain visual contact with the ground or horizon thus prohibiting gaining altitude to avoid terrain and obstacles.

The primary goal of the white paper was to provide a generic method of compliance to meet the certification requirements of 14 CFR §27.1309 and Appendix B for the purposes of certifying normal category single-engine rotorcraft. The use of these "alternate means of compliance" would remove the barriers to cost-effective IFR certification, thus reducing IIMC accidents and improving pilot instrument proficiency.

The Bell 206 was approved for IFR operations in the 1990s with an instrument panel that today looks rather primitive. (Photo via Paul Schaaf)

The white paper included six recommendations aimed at providing alternate means of certification compliance. Unfortunately, of the six recommendations, only the recommendation to establish a graduated level-of-safety based on rotorcraft class similar to that for Part 23 airplanes was addressed in the FAA's newly drafted policy. The remaining five dealt with other areas of policy specifically related to IFR certification, and the recognition of improved technology to allow safer and cost-effective IFR operations for single-engine rotorcraft.

Basically, what the industry is calling for is a path to certification and installation of state-of-the-art instruments that will allow safe, single-engine IFR operations at an affordable cost.

In a response to the FAA's proposal (disseminated on March 8), AHS International provided detailed recommendations and feedback (on March 16) to Lance Gant, Manager, FAA Rotorcraft Directorate, suggesting changes to the policy proposal that would more effectively address the problems currently prevalent in the single-engine helicopter community.

Erik Oltheten, Technical Fellow for Vehicle Management Systems, Bell Helicopter, said that a major shortcoming of the proposed policy statement is that it doesn't adequately provide relief for operations being primarily targeted, such as rotorcraft for EMS single-engine helicopters that would be in Class III.

Under the proposal, Class III aircraft will have to meet a 10^{-8} (one in a hundred million) failures-per-flight-hour criteria for catastrophic failure conditions under the Allowable Quantitative Probabilities. The AHS International recommendations restated the white paper that called for 10^{-7} (one in ten million) for catastrophic failure conditions in this class of helicopter.

Having to go to 10^{-8} will require a triplex system, "which basically doesn't really give us any relief at all," Oltheten said. "It may look like some relief, but it provides very little relief for the population of helicopters we were hoping to affect."

To meet the 10^{-8} probability of failure for Class III aircraft, "you have to go to basically three systems for IFR critical displays such as airspeed, altitude and attitude," Oltheten said. "We are trying to get back to where the dual systems suggested by the rule could meet the requirements. You can't be asking for 10^{-8} and still get dual systems. 10^{-7} is the most you can get. 10^{-6} is typical, but electronics have improved over the years, so we can get 10^{-7} with good dual systems and architecture provisions."

Paul Schaaf, a high time IFR emergency medical services (EMS) pilot who currently flies both single- and dual-engine helicopters, said that getting the IFR certification for single-engine helicopters is "of paramount importance," with the purpose of the white paper to get the FAA "to reconsider the decision they made in 1999 when pushing the certification standards beyond that which was practical for low-cost helicopters." This change, which was not a policy change, but included in an FAA advisory circular (AC) basically required small helicopters to have the same level of probability of failure as a transport (Part 29) helicopter or even an airliner.

He said that in today's world, "we fly a hybrid of VFR and IFR virtually on every flight. The FAA [certification] policy has forced us now in the single-engine helicopter industry to do things that are unsafe in reality. In the EMS role, we'll sometimes fly out to the hospital, pick up the patient, and fly that patient to another

The Bell 407G-series of single-engine helicopters feature the Garman G1000H. Bell introduced the glass cockpit to increase the amount of useful information presented and to improve the pilot's situational awareness. (407GX cockpit photo courtesy of George Mandes)

hospital. Sometimes there are significant delays in getting the patient on board the helicopter and stabilized. The weather can change quite a bit [during that wait]. While it still might be VFR at both the departure point and at the destination, between here and there may be hills and valleys and rivers that accumulated bad weather. What the FAA is doing now is making single-engine pilots plan the flight VFR. If we had a simple IFR certification, we could put it on autopilot, file IFR, stay at 3,000 ft [900 m] and fly safely to the destination.

"But essentially what the FAA is doing is making us get down to 200 ft [60 m], fly through the wire- and tower-infested valley and do these things to get the job done. Now [the] FAA will say, 'Just don't get the job done.' That is not the way it works in reality. What we're asking for is to change the 10^{-8} to 10^{-7} (for Class III helicopters). That is completely within the realm of possibility."
Another disappointment in the proposed policy statement is the lack of relief to allow IFR using a single pitot static system. Under the FAA's AC 27 1303 (contained in AC 27-1B), the loss of airspeed, altitude or attitude is cited as being catastrophic in IFR.

"And you can't have a single point of failure, so a single blocked pitot tube will lose it." Oltheten said. "Even if you have redundant displays, you will lose all your airspeed [indications]. That's not allowed. So even if they give us the relief in probability numbers, you can't go with one pitot system. Many Part 23 airplanes today, and helicopters prior to 1999, flew IFR with a single pitot tube. Back then partial panel techniques were recognized."

Today, however, the use of GPS can make up for redundant pitot systems. "If we've got GPS altitude, we can get GPS ground speed. And while that is not airspeed, we're not flying in the jet stream," Oltheten said. "The difference between ground speed and airspeed is such that if you lose your airspeed, you can still keep the aircraft at a safe speed using ground speed to get yourself out of IFR. So it's not catastrophic. But right now the ACs do not allow me to take credit for that."

Schaaf also objected to requiring 10^{-8} as it necessitates triplex installation of critical safety equipment. "And single-engine helicopters are normally flown single-pilot. So when you throw three systems on us that need individual attention and adjustments, you are really creating a potentially high workload situation just in monitoring redundant systems. So just for the sake of reliability comes along complexity. And it's complexity that kills people, not failure of a system that provides one in 10 million reliability."

The AHS International letter to the FAA's Rotorcraft Directorate specifically recommended authorization to use GPS in lieu of a second pitot system for Class I, II and III rotorcraft, stating that GPS could be considered a backup for loss of airspeed and loss of barometric altitude in the event of a single pitot-static system failure, "provided that the single pitot-static system has a selectable alternate static source (in accordance with Part 27) and that the display of groundspeed and GPS altitude is with sufficient prominence to allow continued safe flight following the loss of airspeed and altitude."

The Future

Matt Zuccaro, president of HAI, said that the draft proposal is a major first step in bringing Part 27 into line with new technology, based on what FAA did with Part 23 for fixed-wing aircraft. And while he is "a little disappointed" that it does not sufficiently address single-engine IFR, it is something that can be added to in the future to meet the requirements of the industry, part of which would be a follow-up to Part 29.

Hopefully, the first step suggested by the proposed Safety Continuum for Part 27 rotorcraft will be followed by a revision that will finally allow single-engine helicopters to take advantage of 21st century technology and save lives.

The significant advances in technology and safety equipment in the past decade have been extraordinary, with GPS and glass cockpits just the most obvious. These advances have blurred the distinction between IFR and VFR: a pilot fully engulfed in clouds today has situational awareness that was unimaginable 10 years ago. Advanced and reliable autopilot systems provide stability and control that out-fly any pilot.

In 2012, Kitchener Aero Avionics receive a supplemental type certificate (STC) to install the Garmin G500H glass cockpit in the single-engine Airbus EC120 Colibri. (Kitchener photo)

Schaaf noted that "it seems obvious that the next step is to get pilots and passengers up and away from the dangers of low-level flight and into the safety of the IFR system — at night, in bad, marginal, suddenly changing weather, there should be no reason to leave it to chance. A few small adjustments to the proposed Safety Continuum can make this a reality."

AHS International invites your feedback on the proposed policy paper, the white paper, and our response. Contact Mike Hirschberg, Executive Director, at ***director@vtol.org.***

About the Author
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