EFVS rulemaking moves forward
Clearing the way for all-weather operations.

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FAA is modifying the operational regulations for instrument approaches for the first time in 30 years, in recognition of the new capability provided by enhanced flight vision systems (EFVS). Based on forward-looking infrared and millimeter-wave imaging radar technology, EFVS (formerly EVS) allows pilots to see at night, in fog and in low visibility.

Under the agency’s proposal, FAR 91.175 will be amended to allow pilots to use a certified EFVS to meet the visibility requirements stated in the regulation, which covers the legal standards for instrument approaches.

Combined with this new rulemaking, EFVS will enable an instrument-rated pilot to continue from the minimum descent altitude (MDA) or decision height (DH) down to 100 ft in weather conditions that in the past would have required a missed approach.

Clearly, EFVS has generated some in-house enthusiasm at the FAA, if the text of FAR 91.175 is any indication: “During some reduced visibility conditions, an EFVS can display imagery that may significantly improve the pilot’s capability to detect objects, such as approach lights and visual references of the runway environment, that may not otherwise be visible.”

Not only does EFVS provide improved instrument approach capability—the technology also offers safety benefits that the government clearly wants to promote. Specifically, EFVS seems to have potential as a remedy for the nagging problems of runway incursions, controlled flight into terrain, approach and landing accidents and inadvertent flight into IFR conditions.

Not an overnight success

FAA’s apparent acceptance of EFVS didn’t happen on a whim, but rather was the culmination of more than 4 years of development work by Gulfstream and Kollsman and 2 years of flight-testing with the agency itself. These trials, which included more than 500 instrument approaches flown at night and in conditions of low visibility, resulted in certification of the Kollsman EFVS aboard the Gulfstream V in Sep 2001.

Originally offered as a customer option on the GV, the Kollsman EFVS has since found its way onto the GIVSP (G300 and G400). Later this summer, Gulfstream plans to FAA-certify the system aboard the G550 (formerly the GVSP) with its Honeywell Primus Epic-derived PlaneView cockpit.

While Gulfstream’s push for EFVS was undoubtedly an effort to provide tangible safety improvement by allowing equipped and training crews to land in visibility as low as 1200 RVR, the system has become a market discriminator.

Other avionics original equipment manufacturers (OEMs) and airframe providers appear to be in catch-up mode, and competing systems from Max-Viz and CMC Electronics are in the works for the Bombardier Global Express and other aircraft, including helicopters. Cessna may even put its considerable weight behind EFVS as the system will most likely migrate to the Citation bizjet series before long.
Convincing the feds

From an operator’s standpoint the EFVS concept is quite simple—the system uses technology to allow the pilot to see what is necessary to continue an approach in visibility conditions that restrict the naked eye and would normally result in a missed approach.

Some within FAA, however, questioned the argument that EFVS or any other electronic device could provide a capability equal to that of human vision. But, by 2002, the agency’s attitude had begun a gradual shift, thanks to a few forward-thinking individuals who saw the potential of EFVS as a tool for safety enhancement.

Leading the push to regulate EFVS is Nick Sabatini, FAA’s associate administrator of aircraft regulation and certification, and John McGraw, director of the agency’s flight technology and procedures division. McGraw’s team includes Les Smith, a former US Coast Guard and airline pilot, and Ernie Skiver, a former US Air Force pilot and FlightSafety Intl instructor.

This is the group that set out to write the regulatory framework for EFVS—a task many in the industry thought impossible. The first public version of the new regs was published in Feb 2003.

The draft rule spelled out the benefits of EFVS and went on to say that from an operational standpoint, EFVS capability is similar to that of the human eye. In addition, provisions for EFVS would be applied to the regulations governing commercial flight—FAR Parts 121 and 135.

Even with the addition of EFVS, the nuts and bolts of FAR 91.175 are unchanged, specifying the visibility requirements for descent below the MDA and DH on non-precision and precision approaches, respectively. The rule even contains a list of specific objects that must be in sight (lights, runway etc) before a pilot may continue an approach.

By altering the rule to accommodate EFVS, FAA is allowing pilots to use the electronic aid as the primary means of obtaining the visual cues stated in the regulation. From a practical standpoint, EFVS allows pilots to descend to 100 ft before transitioning to the unaided eye. Assuming visibility requirements are met at this point, the approach may be continued to a landing. This is truly a new capability in the world of instrument approach procedures.

User community responses

In general, the response of the user community to the rule change was positive. The National Business Aviation Association (NBAA) praised FAA’s effort, although it did propose some refinements to the new rule. The trade group questioned the continued use of real-world flight visibility requirements in the new rule, since EFVS seems to make them irrelevant.

NBAA also pointed out the need to harmonize with Europe’s JAA, principally in regard to the items that need to be visible before a precision approach can be continued below 100 ft.

Talk also focused on the concept that the use of EFVS not be limited to head-up displays (HUDs)—which are specified as a requirement under the current rule.

Further still, NBAA proposed lifting the 100-ft limitation on EFVS, with an eye toward future sensors that may have no real-world weather constraints. Bizjet builder Dassault Falcon weighed in as well, suggesting that the rule be expanded to lift takeoff restrictions on Part 135 operations.
Although Part 135.225 has been altered to make room for EFVS operations, the weather at a particular destination must still be above minimums for a commercial pilot to commence the approach. EFVS does, however, allow the Part 135 pilot to descend to 100 ft after reaching DH, assuming all other criteria are met.

Nearly all of the responses to the draft version of the regulation, however, have stated that both air taxi (Part 135) and commercial air transport (Part 121) aircraft should be given credit for the system and be allowed to use it to initiate the approach.

At this point it appears FAA will likely stick to this position when the final rule is published and, after some operational experience, allow an air carrier to ask for the rule to be changed again.

Part 121 carriers and industry associations, such as the Air Transport Association, have also made their opinions known on the subject of EFVS. Some of the comments are most likely a precursor to some form of transport-category EFVS operations in the near future.

FedEx, for example, was very interested in issues concerning EFVS use in Category III ILS operations, while American Trans Air (ATA) proposed that issues surrounding EFVS and other new technologies be developed through advisory circulars. ATA also suggested that EFVS terminology be standardized so the language would not be a stumbling block as system capability expands.

Other interested parties such as the General Aviation Manufacturers Association (GAMA), ATA and FedEx agree that while the EFVS rule will suffice in its present form, FAA should take a closer look at the specifics of visual transition prior to touchdown. System performance and certification standards should take precedence over actual in-flight visibility, they say.

US military weighs in

During the general comment period that followed FAA’s issuance of the proposed rule, the US Navy and Coast Guard expressed their support for the technology. This is not surprising, considering that several Kollsman EFVS-equipped GVs are flying for the Defense Department.

“During several night approaches to unfamiliar airfields, the EFVS provided immeasurable situational awareness to the pilot,” says US Navy Commander Clay Tettelback, commander of Fleet Logistics Support Squadron 1.

“We believe the overall operational benefits of the Gulfstream [EFVS] are not just for the improved minima during a low-visibility approach, but the overall additional safety the system brings to any aircraft with this system installed.”

The US Coast Guard had similar praise for the system and also expressed enthusiasm for FAA’s apparent validation of the technology. The service did, however, propose that the current 100-ft limitation be replaced by some kind of performance-based criteria.

The USAF weighed in as well—appropriately, as the Defense Dept’s largest EFVS operator. (See this month’s profile of the 89th Airlift Wing, whose 99th Airlift Squadron flies several Kollsman EFVS-equipped GVs). The Air Force Flight Standards Agency (AFFSA), like FAA, is tasked with the review and approval of all aircraft operations.

USAF regulations mirror Parts 121 and 135, in that pilots are not allowed to initiate an approach if the reported visibility is less than what the approach plate calls for. But the recent influx of EFVS-equipped aircraft has pushed the AFFSA to focus on crafting new guidelines for use of the system.

AFFSA is now reviewing the body of knowledge surrounding EFVS, and seeing how it all plays with established C37A (GV) crew procedures. The group is expected to issue its recommendation this fall.

Open door to innovation

So as not to be limited to FAR 91.175, FAA has also undertaken a review of many current certification and operational regulations. Several longstanding regulations that limited flight operations in the past are now under review.

As far as EFVS is concerned, the best news probably lies within FAR 91.175, which opens the door to future development. Section “m” says that EFVS can be “an electronic means to provide a display of the forward external scene topography such as a forward-looking infrared, millimeter-wave radiometer, millimeter-wave radar, and low-light-level image intensifying.”

So, without much prodding, it appears that FAA has “seen the light,” so to speak, and is opening the door for future EFVS technologies that may offer levels of performance not previously seen in the aviation world.