

to using an EFVS to satisfy § 91.175(l) requirements, an EFVS may allow the pilot to observe an obstruction on the runway, such as an aircraft or vehicle, earlier in the approach, and observe potential runway incursions during ground operations in reduced visibility conditions. Even in situations where the pilot experiences marginal visibility at the DA, DH, or MDA, he or she could still use an EFVS to have better situational awareness than may be possible without it.

**Category I operations**—The intent of this proposed rule is to retain the existing straight-in-landing Category I instrument landing system (ILS) or nonprecision instrument approach minima and to authorize the pilot to use FAA-certified EFVS imaging-sensor technologies to determine enhanced flight visibility. This proposed rule would allow a pilot to fly a straight-in landing Category I or nonprecision approach and descend below the DA, DH, or MDA using an EFVS.

**Category II and Category III ILS approach procedures**—This proposed rule would not allow the use of an EFVS for Category II and III ILS approach procedures. Proposed enhanced flight vision systems for these approaches would have to comply with the more stringent reliability, redundancy, and other criteria, as prescribed in applicable sections of 14 CFR and applicable advisory circulars.

**Visual references**—Section 91.175(c)(3) lists ten visual references, of which only one is required for the pilot to descend below the DH or MDA. The visual references are: (1) The approach light system, (2) threshold, (3) threshold markings, (4) threshold lights, (5) runway end identifier lights, (6) visual approach slope indicator, (7) touchdown zone or touch down zone markings, (8) touchdown zone lights, (9) runway or runway markings, and (10) the runway lights. If the approach light system is used as the reference, the pilot may not descend below 100 feet above the touchdown zone elevation unless the red terminating bars or the red side row bars are also distinctly visible and identifiable. As a parallel, the proposed rule states that, when using an EFVS, the approach light system (if installed), the runway threshold lights or markings, and the runway touchdown zone lights or markings would have to be distinctly visible and identifiable to the pilot.

Because the imaging-sensor technologies may not sense or display all of the identifying features of the visual references (e.g., may not distinguish colored lights), the FAA is proposing that the approach light

system (if installed), or the runway threshold and the touchdown zone, would have to be distinctly visible to the pilot when using the EFVS prior to descent from the DA, DH, or MDA. At 100 feet above the touchdown zone elevation and below, there would have to be sufficient flight visibility (without reliance on an EFVS) for the intended runway to be distinctly visible and identifiable to the pilot to continue to a landing.

**Pilot qualifications**—To use the EFVS equipment while conducting an instrument approach procedure under this proposal, the pilot(s) would have to be current and qualified in accordance with existing applicable requirements in 14 CFR part 61, 121, 125 or 135. Each foreign pilot would have to be qualified in accordance with the requirements of the civil aviation authority of the State of the operator. Foreign air carriers would be required to comply with this rule and their operations specifications. For all operators, this would include knowledge of the EFVS training requirements, operational procedures, and limitations as prescribed in the approved Airplane or Rotorcraft Flight Manual for the specific system.

**Certification process**—An EFVS proposed for use under this proposed rule would have to provide the pilot with sufficient guidance and visual cues so that the pilot could manually maneuver the aircraft to a landing on the intended runway. The sensor image alone may not be suitable to maneuver the aircraft. For the pilot(s) to maximize situational awareness while maneuvering the aircraft in the visual segment of the instrument approach procedure, at low altitudes and reduced visibility conditions, the FAA is proposing that several key components be provided by an EFVS to provide an adequate level of safety. The EFVS sensor imagery would have to be presented on a HUD that is centrally located in the pilot's primary field of view and in the pilot's line of vision along the flight path. The imagery must be real-time, independent of the navigation solution derived from the aircraft avionics, and must be clearly displayed so that it does not adversely obscure the pilot field of view through the cockpit window. Aircraft flight symbology, such as airspeed, vertical speed, attitude, heading and altitude would have to be displayed on the HUD and be clearly visible to the pilot. The displayed sensor imagery and aircraft symbology could not adversely obstruct the pilot's vision looking through the aircraft's forward windshield.

The FAA would conduct the certification and evaluation process in

accordance with published guidance and current policy. The FAA would also evaluate the capabilities, operational procedures, training and limitations for the specific system as it is designed and flight-tested. In all cases, the applicant for an airworthiness type design would provide the FAA's Aircraft Certification Office (ACO) with a certification plan. The FAA would evaluate the plan to determine if it is addressed by current regulations or if special conditions would have to be established for the certification. The proposed EFVS would be evaluated in an operational context to determine if the system provides an equivalent level of safety when in operation compared to the present rules.

## Section-by-Section Analysis

### Section 1.1 General Definitions

The FAA proposes to amend § 1.1 to add definitions for the terms "enhanced flight visibility," and "enhanced flight vision system (EFVS)." Including these terms in the FAA's regulations would allow for the use of new technology and establish the characteristics the FAA believes are essential for safe operations.

The FAA also proposes to add definitions for the terms "synthetic vision" and "synthetic vision system." Although this proposed rule would not allow for synthetic vision, which is a database computer-generated image, the FAA believes it is necessary to distinguish it from an enhanced vision system, which uses imaging-sensor technology.

### Section 1.2 Abbreviations and Symbols

The FAA is proposing to add the abbreviation "EFVS" to § 1.2 to reflect the addition of the proposed new term "enhanced flight vision system (EFVS)" in § 1.1.

### Section 91.175 Takeoff and Landing Under IFR

**Paragraph (c)**—Paragraph (c) introductory text (as proposed at 67 FR 77341; Dec. 17, 2002), would be further amended to add the phrase "except as provided in § 91.175(l) of this section, \* \* \* ." As discussed below, paragraph (l) would be added to allow the pilot to descend below the DA, DH, or MDA on a standard instrument approach using an EFVS. If a pilot cannot meet the requirements of § 91.175(c) using natural vision, the exception to those requirements as provided in paragraph (l) using an EFVS would apply.

**Paragraph (d)**—The FAA proposes to revise paragraph (d) to add a new requirement that no pilot operating an aircraft may land that aircraft when, for