Miscellaneous Systems & Equipment Inlet Barrier Filter (IBF) , High Angle Steep Intercept Approaches, Hoist TSO

Federal Aviation Administration

Presented to: EASA Ninth Rotorcraft Symposium

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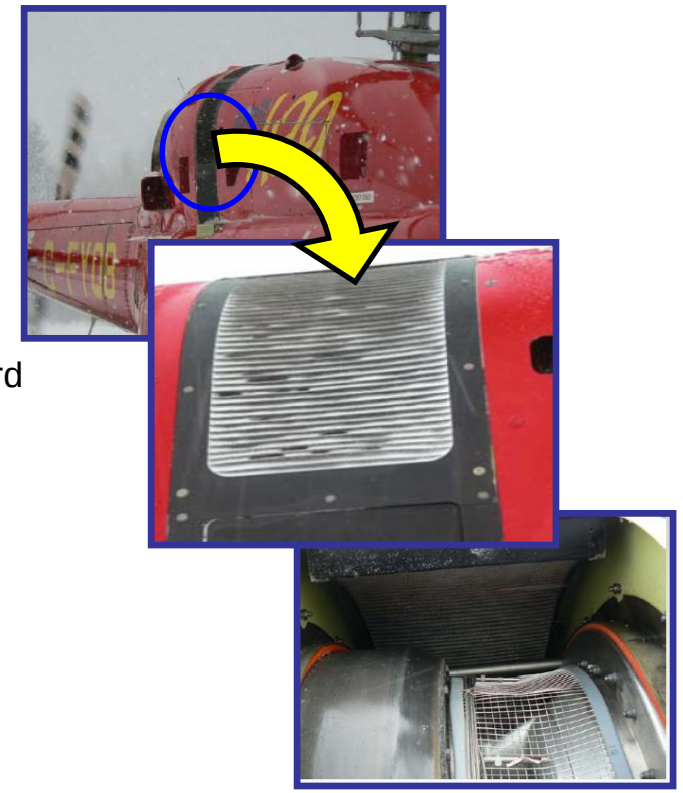
Date: 2 December 2015

Overview

- **Inlet Barrier Filter (IBF)**
- **Low Speed, Steep Angle, Autopilot Couple RNAV IFR Approaches to VFR Heliports**
- **Hoist TSO Status**

IBF Policy

- **Why is policy needed?**
  - Increased use of IBF installations on rotorcraft has driven need for policy to ensure safe & standardized installations
  - Recent increase of IBF installations by 3rd party modifiers



- **Is there a change in FAA Airworthiness Standards?**
  - No, the regulations are unchanged
  - IBF Policy provides clarity and guidance on the applicable requirements for the certification of IBF installation for OEM's and Modifiers

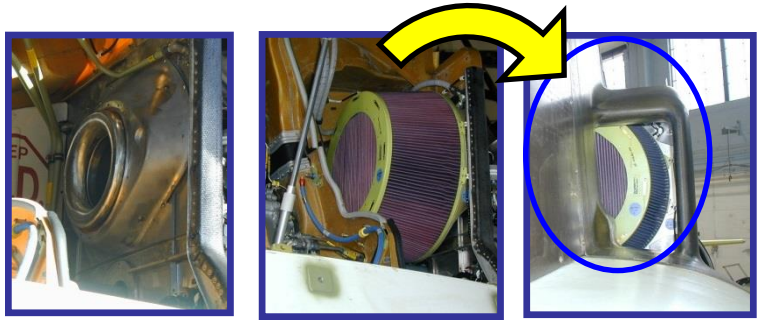
IBF Description

- **Inlet Barrier Filter**

  – A filter assembly that is integrated into a rotorcraft engine air inlet installation to prevent air particles and debris from being ingested by the engine.

- **Pros:**

  – Provides added engine protection, which may lead to increased engine life and reduced maintenance / warranty claims



- **Cons:**
  - As filter becomes blocked, can result in performance degradation.
  - If not properly evaluated, can result in adverse operating conditions

IBF Policy (Cont.)

- **Regulations**
  - Part 27 & 29 FARs do not require the installation of IBF systems.
  - However, when an IBF is installed the applicant must ensure a safe installation by compliance with the applicable regulations.

Regulation	Description
14 CFR 27 / 29.45	General (Performance)
14 CFR 27 / 29.901	Installation (Powerplant)
14 CFR 27 / 29.939	Turbine engine operating characteristics
14 CFR 27 / 29.1041	General (Cooling)
14 CFR 27 / 29.1043	Cooling tests
14 CFR 27 / 29.1091	Air induction
14 CFR 27 / 29.1093	Induction system icing protection
14 CFR 27 / 29.1309	Equipment, systems and installations
14 CFR 27 / 29.1321	Arrangement and visibility
14 CFR 27 / 29.1322	Warning, caution, and advisory lights
14 CFR 27 / 29.1529	Instructions for continued airworthiness
14 CFR 27 / 29.1581	General (Rotorcraft Flight Manual and Approved Manual Material
Appendix B to Parts 27 & 29	Airworthiness criteria for helicopter instrument flight)
Appendix C to Parts 27	Criteria for Category A operation

NOTE: Not complete list. Other regulations may apply depending on IBF system design details.

IBF Policy (Cont.)

- **Content**
  - General Design Considerations
  - Installed Performance
  - Inlet Distortion & Turbine Engine Operating Characteristics
  - Ice & Snow Protection
  - Alternate Air Source
  - Structural Considerations
  - Aircraft Cooling
  - Crew Alerting
  - Additional Flight Test Considerations
  - Category A Considerations
  - RFM Operational Procedures
  - Instructions for Continued Airworthiness (ICA)

IBF Policy (Cont.)

- **Installation Considerations**
  - IBF system must comply with 27/29.901
    - The installation must comply with the §33.5 engine manufacturer's installation instructions
    - IBF blockage levels should not produce adverse engine operating characteristics (i.e. engine inlet distortion, surge, etc.)
  - IBF system must comply with 27/29.1309.
    - System malfunctions & resulting hazards must be addressed.
    - FHA should be submitted early in project for FAA review.
  - IBF blockage evaluation
    - Contamination (e.g. dirt) may not produce worst case IBF pressure loss.
    - Dry snow or ice can produce excessive pressure losses & should be evaluated separately.

IBF Policy (Cont.)

- **Flight Test Considerations**
  - Performance loss due to excessive contamination
    - Rotorcraft performance must account for filter blockage
      - Can present as a degradation or present new charts
      - Cannot base performance solely on power assurance checks
  - Crew alerting
    - Cockpit annunciation of filter blockage (bypass needed)
    - Cockpit annunciation of bypass not in commanded configuration
  - Category A approval
    - Power degradation affects *performance* and *procedures*
    - Alternate: RFMS limitation prohibiting Category A operations
  - RFM Procedures
    - Preflight checks (walk around and system checks)
    - Emergency procedures to address clogged filter
    - Relevant performance data

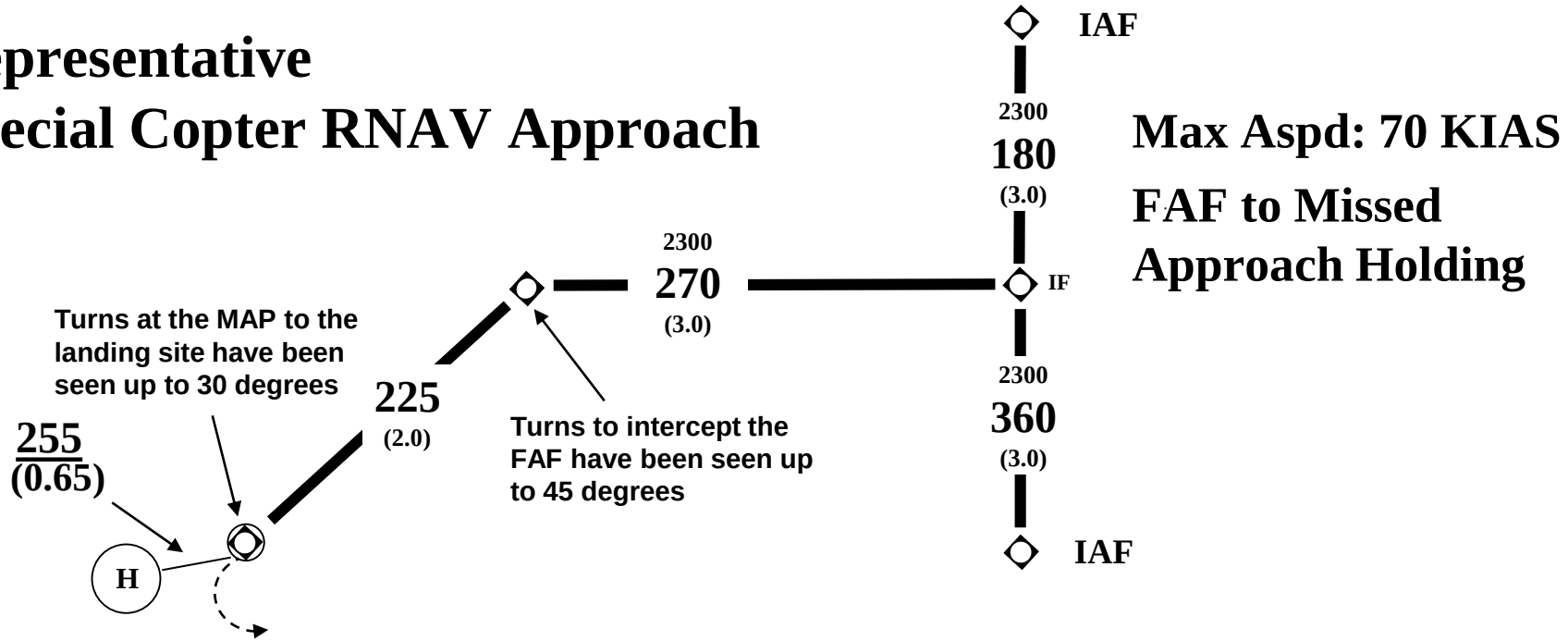
IBF Policy (Cont.)

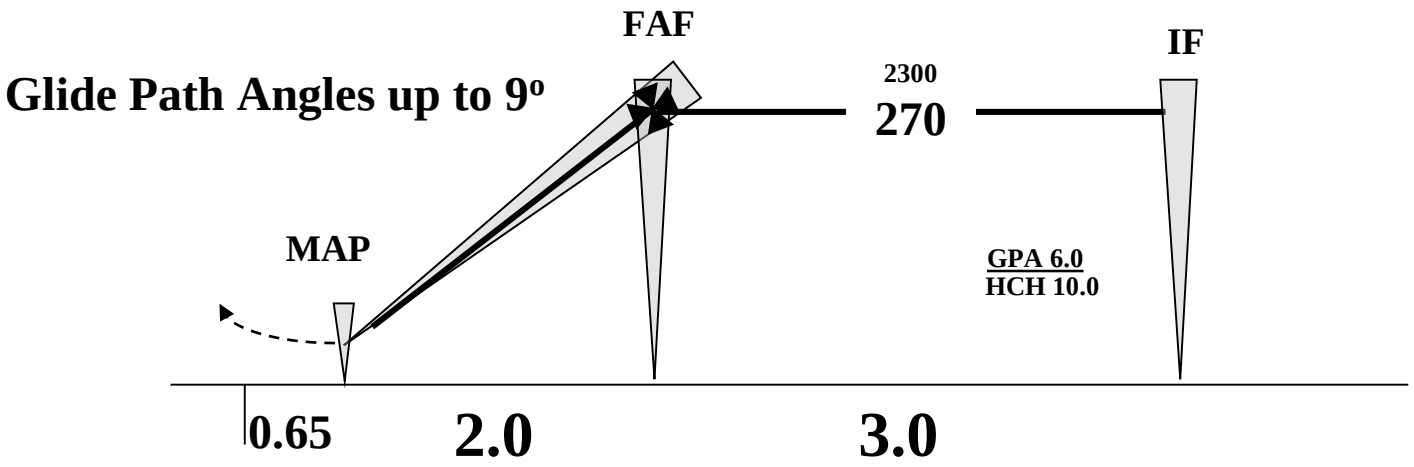
- **Policy Coordination Status**
  - Should be submitted for public comment in early 2016.
  - Policy will be issued as a policy statement
  - IBF has been added to the Rotorcraft Significant Project List
  - Future revision of AC's 27-1 & 29-2 will incorporate this policy statement into the miscellaneous guidance sections.

Low Speed, Steep Angle, Autopilot Coupled RNAV IFR Approaches to VFR Heliports

- Special Instrument Approaches Provide Operators Means to Access Helipads (Max 70 KIAS)
- WAAS (EGNOS) is used for theses approaches, often with geometries that are not part of standard instrument procedures.
- These approaches also tend to have steep glide path angles in addition with turns at the FAF and after MAP to the landing site.
- Both Modern and “Legacy” Aircraft Can Have Integration Problems with their respective autopilots.

Representative Special Copter RNAV Approach





FAA Experience:

- All of the legacy aircraft flown using 3 Axis autopilots coupled to GS do not like speeds below ~70 KIAS
  - Airspeed control is difficult leading to higher than acceptable workload
  - Coupling to IAS decreases pilot workload to acceptable level (depending on aircraft)

- Pilot workload compounded by special copter RNAV approach geometry:
  - Short intermediate (3nm) and final (2nm) approach segments
  - High final approach glide path angles

FAA Lessons Learned (So Far):

- Require autopilot coupled to IAS on ‘Copter RNAV approaches regardless of LPV, LNAV
  - During those operations where autopilot is required in lieu of second in command
- Encourage 4 axis autopilots on new aircraft

FAA Lessons Learned (So Far):

- Upgrading current GPS to WAAS is not simple (For IFR):
  - AFCS and FGS integration critical
  - GPS Waypoint Name/Distance-to in primary FOV.

- Evaluate Aircraft handling characteristics during low speed, steep GPA approaches (14 CFR 27/29 Appendix B)

- There is a need for better guidance on acceptable criteria

Rotorcraft Policy for Low Speed, Steep Angle, Autopilot Couple RNAV IFR Approaches to VFR Heliports

- **Policy Coordination Status**
  - Should be submitted for public comment in 2016.
  - Policy will be issued as a policy statement
  - Has been added to the Rotorcraft Significant Project List
  - Future revision of AC's 27-1 & 29-2 will incorporate this policy statement.

Hoist TSO Overview:

- SAE committee G-26 formed to develop new aerospace standard for helicopter hoists
- Committee members include hoist OEMs, helicopter OEMs, operators, FAA and EASA
- The new aerospace standard will form the basis for a new FAA TSO
- FAA TSO will have recognition from EASA

G-26 Representatives

- **Hoist OEMs:**
  - UTC Aerospace Systems (UTAS) (Goodrich hoists)
  - Breeze-Eastern Corp
- **Helicopter OEMs:**
  - Airbus Helicopters
  - Airbus Helicopters Deutschland GmbH
  - AgustaWestland SpA
  - Bell Helicopters Textron
  - Bell Helicopters Textron Canada
  - Sikorsky Aircraft Corp
- **Hoist Operators:**
  - LA Sheriffs Department
  - US Army
  - US Coast Guard
  - ERA Helicopters

FAA Perspective:

- Having a TSO on helicopter hoists will provide additional level of safety through a controlled manufacturing process

- Hoists meeting TSO requirements are considered to be airworthy components

- TSO does not automatically ensure installation requirements
  - TSO will provide parts that can be easily installed
  - Installer must provide proof of compliance with installation regulations

Timeline / Estimates:

- February 2015 - Kick-off meeting
- December 2015 – draft standard AS6342 developed
- February 2016 – voting on final AS6342
- May 2016 – AS6342 published
- June 2016 – draft TSO developed
- November 2016 – TSO published

Questions?