PBN Operational Approval Process - FAA

Presented to: ICAO Asia-Pacific PBN Implementation Seminar 2010

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Integration of Efforts for PBN
Overview

• Components of Operational Approval
• Challenges
• U.S. Operational Approval Process
• U.S. PBN-specific Guidance Materials, Tools, and Approval Mechanisms
• Summary
Components of Operational Approval

- Eligible/qualified/approved **aircraft and navigation equipment** - performance and functionality
  
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- **Procedures** for flight crew/pilots, maintenance, and dispatch - as appropriate

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- **Training** for personnel – ground/simulator/flight

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- **Approval/authorization** mechanism (for example, Operations Specification) - as necessary
Challenges

- Development of necessary operator and inspector guidance…understanding of requirements
- Determination of aircraft/equipment, procedures, and training suitability for proposed operation
- Availability of authorization mechanisms (and adequate resources)

Notional Levels of Difficulty

“Easy”
RNAV 5  RNAV 2  RNAV 1  RNP APCH  RNAV 10

“Challenging”
RNP 4  RNP AR APCH
U.S. Operational Approval Process

- **Phase 1 PRE-APPLICATION**: Application initiated
- **Phase 2 FORMAL APPLICATION**: Operator submits a proposal
- **Phase 3 DOCUMENT COMPLIANCE**: FAA’s analysis and evaluation
- **Phase 4 DEMONSTRATION AND INSPECTION**: Operator’s demonstration
- **Phase 5 CERTIFICATION**: Approval or Acceptance via…
  - Operations Specifications (OpsSpecs)
  - Management Specifications (MSpecs)
  - Letter of Authorization (LOA)
Flexibility in Approval Processes

- **Inspector Assessment.** The complexity of the certification process is based on the inspector’s assessment of the applicant’s proposed operation. For simple certifications, some steps can be condensed or eliminated.

- **Differences Among Applicants.** Some applicants may lack a basic understanding of what is required for certification. Other applicants may propose a complex operation, but be well prepared and knowledgeable. Because of the variety in proposed operations and differences in applicant knowledge, the process must be thorough enough and flexible enough to apply to all possibilities.

-FAA Order 8900.1
Approval / Concurrence by Field, Region, and Headquarters Offices

• **Headquarters** - develops policy development and national guidance
• **Regions** - provides technical and geographic expertise
• **Field** (local operations inspectors) - approves operation if equipment, procedures, and training are satisfactory
  – Includes review by maintenance / avionics inspectors
  – Additional HQ / Region concurrence for approval may be required
  – Evolution and complexity of technologies affects HQ / Region involvement
    • RNP AR (HQ and Region concurrence)
    • ILS Category II and III (Region concurrence)
    • RNP APCH (Field approval…with Region/HQ assistance if necessary)
# FAA PBN Advisory Circulars/Orders

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<td>Order 8260.54A</td>
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<td>Advanced-RNP 1 [TBD- Proposed Advanced RNP]</td>
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<td>AC 90-96A</td>
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<td>RNP 4</td>
<td>Order 8400.33</td>
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<td>Order 8400.12A</td>
<td>N/A</td>
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*Other criteria for equipment also apply (TSOs, 20-series ACs, etc.), as well as FAA 8900.1 and OpsSpecs, MSpecs, LOAs.
FAA Advisory Circular 90-100A and Compliance Table for RNAV 1 and RNAV 2

1. PURPOSE.

a. This advisory circular (AC) provides operational and approval guidance with regard to Area Navigation (RNAV) operations. Operators in the United States operate under these procedures to determine their eligibility for these U.S. RNAV routes. The AC also contains the Operational Approval Process for RNAV 1 and RNAV 2.

NOTE: New applicants for a type certificate (TC) or supplementaltype certificate (STC) should include a statement of compliance to this AC and provide documentation of the compliance to the approval authority when the aircraft is initially introduced to the market.

b. Applicability of AC 90-100A. AC 90-100A applies to operations using RNAV (RNAV) routes, (Q-routes and T-routes), Departure Procedures and Standard Instrument Departures, and Standard Terminal (STAs) and Standard Terminal Approach Procedures (STAPs) as published in the FAA Air Traffic Control (ATC) (Radar) Traffic Management System (RTMS). This AC does not apply to operations using RNAV routes defined by ICAO Annex 10, Volume 3, section 3.2 (Gulf of Mexico and the Atlantic Ocean) or Alaskan VOR/DME RNAV routes, not to offshore RNAV Operations, Alaska GPS routes, or operations involving offshore or specific localized procedures.

c. Performance-based navigation concept. This AC is not intended to be a functional criterion for RNAV procedures. Airworthiness standards are based on the performance of systems and equipment used in the U.S. National Airspace System (NAS) and the FAA's compliance with this AC, as well as the criteria contained herein.

d. Background. This criterion is consistent with the ICAO's implementation of non-precision navigation (RNAV 1 and RNAV 2) operations effective January 2005. Since then, ICAO has continued to annex

http://www.faa.gov/about/office_org/headquarters_offices/avs/offices/afs/afs400/afs470/media/AC90-100compliance.xls
Example Guidance Material for RNP Approach

1. PURPOSE. This advisory circular (AC) provides system and operational approval guidance for operators to conduct Title 14 of the Code of Federal Regulations (14 CFR) part 97, Required Navigation Performance (RNP) Instrument Approach procedures (IAPs). This AC provides system and operational approval guidance for the conduct of RNP Instrument Departure Procedures (RNP 1 DP), Standard Terminal Arrival Routes (STARs) (RNP 1 STARs), and RNP 1 courses within the U.S. National Airspace System (NAS) where domestic air traffic control (ATC) procedures are applied. This AC also provides operational approval guidance for the conduct of barometric vertical navigation (baro-VNAV) RNP IAPs with the lateral navigation (LNAV)/vertical navigation (VNAV) minimums within the NAS.

2. APPLICABILITY.

a. Guidance. The guidance contained in this AC applies to all operations conducting RNP operations under 14 CFR parts 91, 92, 93, 121, 125, 129, and 135 within the United States. This AC does not apply to RNP Special Aircraft and Access Approval Request operations, which are covered by AC 90-101, Approval Guidance for RNP, SAAAR. Mandatory terms used in this AC such as “mandated” are used only in applicability of these particular methods of compliance when the accepted compliance described herein is used. This AC does not change, add, or alter regulatory requirements or authorize deviations from regulatory requirements. In lieu, guidance in this AC without deviation, operators may elect to follow an alternative method if found to be acceptable by the Federal Aviation Administration (FAA).

b. Structure. After the initial paragraphs which include terminology and a brief overview of this AC, the following paragraphs are organized as follows:

- General Information (paragraph 7).
- Operational Considerations (paragraph 8).
- Operator Responsibilities (paragraph 9).
- Approval for Operations in Altimets (paragraph 10).
- Appendix 4: Use of Barometric VNAV.

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**TSO-C129**

**Class A - GPS sensor and navigation capability:**

- A1: Yes, Yes, Yes
- A2: Yes, Yes, Yes

**Class B - GPS sensor data to an integrated navigation system (e.g., FMS, multi-sensor navigation system, etc.):**

- B1: Yes, Yes, Yes
- B2: Yes, Yes, Yes
- B3: Yes, Yes, Yes

**Class C - GPS sensor data to an integrated navigation system (as in Class B) which provides enhanced guidance to an autopilot, or flight director, to reduce flight path errors. Limited to 14 CFR Part 121 or equivalent rules:**

- C1: Yes, Yes, Yes
- C2: Yes, Yes, Yes
- C3: Yes, Yes, Yes
- C4: Yes, Yes, Yes

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FAA RNP AR Aircraft Approvals

- Aircraft approved
  - Boeing: B-737
  - Airbus: A-318/319/320/321
  - Gulfstream: G450/550

- Future Aircraft approvals
  - Boeing: B-777, -767, -757
    - Application by Boeing for fleet-wide documentation and qualification is pending
  - Embraer: E-170, -190
  - Cessna: TBD
  - Bombardier: TBD
  - Dassault: TBD
Some Thoughts on Training…

• “Core” subjects are common across PBN operations
  – Form foundation (for example, what is RNAV?)
  – No need to repeat information for each operation
• Initial and recurrent ground/flight training requirements need to be addressed
• Simulator equipage may be an issue
• For inspectors – need to have foundational knowledge and, at least, general understanding of operations
U.S. Approval Mechanisms

- Are dependent upon factors such as-
  - Anticipated users
  - Maturity of technology
  - Supporting certification standards and amount of operational mitigations (possibly requiring additional procedures and training)
  - Complexity of operation (including other CNS/ATM considerations)

- In general, commercial operators require specific authorization for PBN operations (not the case with less “complex” operations for general aviation)
U.S. Approval Mechanisms (continued)

- For domestic operations, approvals are categorized by operation/flight phase not navigation specification.
- For oceanic operations, separate approvals are given for navigation specification and area of operation (plus other CNS/ATM requirements such as datalink).
- Large variety of detailed OpsSpecs, MSpecs, and LOAs for different purposes:
  - C052 Approaches
  - C384 RNP AR Approaches
  - C063 RNAV 1 Departures and Arrivals
  - B035 RNAV 2 Routes
  - ...

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Federal Aviation Administration

Table 1 - Authorized Instrument Approach Procedures

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<tbody>
<tr>
<td>LDA/DME</td>
<td>LDA with glide slope</td>
<td>ILS</td>
</tr>
<tr>
<td>LOC</td>
<td>RNAV (OPS) (see note (a))</td>
<td>LIA/DME</td>
</tr>
<tr>
<td>LOC-ILS</td>
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Table 1 - Aircraft With RNAV Systems Eligible for RNAV 1 DPs and STARS

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Model/IHW Part #</th>
<th>Software Part Version/Revision Number</th>
<th>Limitations and Provisions</th>
</tr>
</thead>
</table>

Table 1 - Airplane(s), RNAV Equipment, and Q-Routes Authorized

<table>
<thead>
<tr>
<th>Airplane Type (Make/Model/Model)</th>
<th>Navigation Equipment (Manufacturer/Model)</th>
<th>Domestic RNAV Q-Route</th>
</tr>
</thead>
</table>

a. The certificate holder is authorized to conduct the following types of instrument approach procedures and shall not conduct any other type:

- LDA/DME
- LOC
- LOC-ILS
- LDA with glide slope

b. Authorized Aircraft and Equipment: The certificate holder is authorized to conduct RNAV 1 DPs and STARS operations using the following eligible aircraft and area navigation systems installed and operational as required by the AFM, CFR, or the FAA compliance table, or in those operations specified.

Table 1 - Aircraft With RNAV Systems Eligible for RNAV 1 DPs and STARS

- Required Navigation Performance (RNP) Procedures With Special Aircraft and Aircrew Authorization Required (SAAAR)
- Required Navigation Performance (RNP) Procedures Without Special Aircraft and Aircrew Authorization Required (SAAAR)

- Class I Navigation in the U.S. Class A Airspace Using Area or Long-Range Navigation Systems

- Airplane(s), RNAV Equipment, and Q-Routes Authorized

- Airplane Type (Make/Model/Model) and Navigation Equipment (Manufacturer/Model)

- Domestic RNAV Q-Route
ATO RNAV / RNP Group

www.faa.gov/ato?k=pbn

Flight Standards Service

www.faa.gov/about/office_org/headquarters_offices/avs/offices/afs/afs400/afs470/

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Summary

• U.S. processes for PBN operations approval provide for standardization and flexibility

• Some approvals are more challenging (but not impossible) than others

• Ongoing effort to educate operators and inspectors regarding requirements for operational approval (and also streamline processes)

• Material regarding aircraft eligibility for most PBN operations exists today

• Goal remains to enable safe operations
Thank you