ICAO-ENAC PBN PROCEDURE DESIGN COURSE

REFERENCE AND TITLE

Performance Based Navigation Concept :

Procedure design course for PBN applications:

RNAV1 SID and STAR, RNP APCH (Non Precision Approach and APV Baro-VNAV)

COURSE DURATION

Two weeks, 10 class days

NUMBER OF PARTICIPANTS:

A maximum of 15 trainees

WHEN AND WHERE

From

Course and documents in English without translation.

INSTRUCTORS

Sandrine Fournie, Denis Cabrieres and Sebastien Barrau are instructors at ENAC (French Civil Aviation University).

Sandrine is a PANS-OPS instructor. She is involved in the French group regarding French PANS-OPS regulation and implementation. She was one of the instructors for previous PBN course in Cuba and Africa.

Denis is a PANS-OPS instructor for more than 25 years. He is involved in the French group regarding French PANS-OPS regulation and implementation.

Sebastien is a PANS-OPS instructor. He is involved in the French group regarding French PANS-OPS regulation and implementation. He is participating in ICAO Instrument Flight Procedure Panel (IFPP) meetings as advisor to the French member.He was instructor for previous ICAO PBN course in India, Hong Kong, Middle-East region and Africa.

For further information on the course content, contact:

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OBJECTIVES

The purpose of the course is to apply procedure design criteria to the development of procedures for a select set of the navigation specifications in the Performance Based Navigation Manual dealing with terminal and approach operations. The general concept of PBN is presented, then the procedure design criteria associated with some specific applications such as Basic-RNP 1, RNAV 1, RNP APCH and baro-VNAV are studied and applied and the procedure design is documented.

Terminal objective 1:

Conditions of performance	Given maps and other documents containing validated data,
Expected Behaviour	The trainee will design a Basic-RNP 1 or RNAV 1 SID procedure based on use of GNSS sensor
Standard	In accordance with PANS OPS, Doc 8168

Terminal objective 2:

Conditions of performance	Given maps and other documents containing validated data,
Expected Behaviour	The trainee will design a Basic-RNP 1 or RNAV 1 STAR procedure based on use of GNSS sensor
Standard	In accordance with PANS OPS, Doc 8168

Terminal objective 3:

Conditions of performance	Given maps and other documents containing validated data,
Expected Behaviour	The trainee will design an RNP Approach procedure (APV Baro-VNAV), based on RNP APCH operations
Standard	In accordance with PANS OPS, Doc 8168

Terminal objective 4:

Conditions of performance	Given maps and other documents containing validated data,
Expected Behaviour	The trainee will design an RNP approach procedure (NPA), based on RNP APCH operations
Standard	In accordance with PANS OPS, Doc 8168

Terminal objective 5:

Conditions of performance	Given completed procedure design with all associated documents and data
Expected Behaviour	The trainee will document a Basic-RNP 1 or RNAV-1 SID and STAR, an RNP approach procedure (NPA), and an RNP approach procedure (APV Baro-VNAV), for validation, publication and traceability
Standard	Accurately, in a reasonable time, and in accordance with PANS OPS, Doc 8168, Annex 4, Annex 15, Quality Assurance Manual for Flight Procedure Design and other guidance

PARTICIPANTS

People involved in procedure design or with serious background in procedure design.

Prerequisites:

- Student should be trained and experienced in design of non-RNAV SID, STAR and NPA procedures as well as ILS procedures. (reference Doc 8168-OPS/611, Volume II, Part I and Part II).
- Trainees should have fundamental knowledge of Performance Based Navigation as in:
    - completion of the ICAO Web-based PBN Training (http://icao.int/pbn)
    - attendance at an ICAO Introduction to PBN Seminar or review of the ICAO draft PBN Manual
- Air Traffic Management
  Students should have fundamental knowledge of Air Traffic Management (ATM) as in ICAO doc. 4444 (PANS-ATM).
- Navigation, Navigation Systems, Aircraft Performance and Geography
  Students should have knowledge of Navigation, Navigation Systems, Aircraft Performance and Geography.
  For instance, knowledge to the level obtained in any pilot's license with Instrument Rating (IR) ground school would be acceptable.
- Aeronautical Information Services
  Students should have fundamental knowledge of Annex 15 (Aeronautical Information Services).
- Aerodrome safeguarding
  Students must be familiar with the basic requirements for aerodrome safeguarding (Annex 14 Obstacle limitation surfaces, Aerodrome reference codes).
- Geodesy
  Students should have fundamental knowledge in Geodesy and be familiar with WGS84
- Charting
  Student should be familiar with the fundamental charting requirements of Annex 4 with regard to SID, STAR and Approach charts.
- Language :
  Student should have adequate English language communication skills

Sample of prerequisite exercises are provided in advance.

This training course does not use specific procedure design software and therefore trainees will design procedures manually. For that reason, students should bring a ruler, protractor, compass, and calculator.

ASSESSMENT

An initial assessment is conducted before the course through a sample of elementary exercises that are checked by instructors prior to the course. Those exercises are sent to the attendees two months before the course, to be returned one month before the course for evaluation.

Progress tests are conducted during the course.

Eventually, the presentation of the project enables assessment of the capacity of the trainee to meet the terminal objectives, by applying the criteria to actual procedure designs and, as a secondary objective, to demonstrate the capacity of the trainee to summarize, to write a technical report and to present a procedure design study.

TOPICS COVERED

PBN concept:
- General overview.
- Description of navigation specifications,
- Avionics, aircraft equipment and airworthiness regulations
- Which application for which airspace?
- Performance – notion of accuracy , precision , continuity , availability

GNSS concept:
- Aircraft based augmentation system (ABAS)
- Satellite based augmentation system (SBAS) in a PBN context
- Ground based augmentation system (GBAS) in a PBN context

Quality assurance (Quality Assurance Manual for Flight Procedure Design)
- Document and store procedure for traceability
- Data origination
- Procedure design process

Procedure design criteria (Pans-Ops, Volume II, Part III, Sections 1, 2):
- Underlying criteria
- General criteria such as
  - Minimum length of segments
  - Turn protection
  - T and Y concept
  - TAA

Procedure construction (Pans-Ops, Volume II, Part III, Section 3 and proposed amendments)
- Departure criteria applicable for Basic-RNP 1 and RNAV 1 /2
- Standard arrival for Basic-RNP 1 and RNAV 1/2
- Approach procedure for RNP APCH operations
- APV baroVNAV procedure
- Document procedure for validation and publication (Pans-Ops, Volume II, Part III, Section 5)
- Charting and coding

MEANS		

- Theoretical lectures : Presentation and explanation of the rules and principles described in PANS OPS, Doc 8168-OPS/611
- Laboratory exercises

Lectures are followed by practical exercises, scheduled on a daily basis, that illustrate the elementary application of criteria in a simplified environment, in order to reinforce theoretical input.

- Comprehensive On-the-Job Training (OJT) Project:

Part of the second week is devoted to an OJT project. It consists of the design of an RNAV 1 SID and STAR, an RNP APCH NPA and an APV Baro-VNAV procedure. The OJT project is conducted in teams of three. It is based on an actual airport environment in order to simulate the actual job conditions. The design is conducted step by step under assistance and tutorial of instructors. The project also includes the design of drafts of SID and STAR charts and Instrument Approach Charts, a technical report and coding instructions.