



PBN and Procedure Design | training

Aeropath™



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Get your Procedure Designers ready for PBN Implementation

Aeropath: Experienced Procedure Design, Effective Training Solutions

Aeropath has the largest commercial Procedure Design organisation in Asia-Pacific and decades of design experience throughout the region. We have used our experience to develop a training syllabus that effectively covers the spectrum from fundamental concepts to Advanced PBN. Our courses have been built by designers and training experts, with both new and experienced designers in mind.

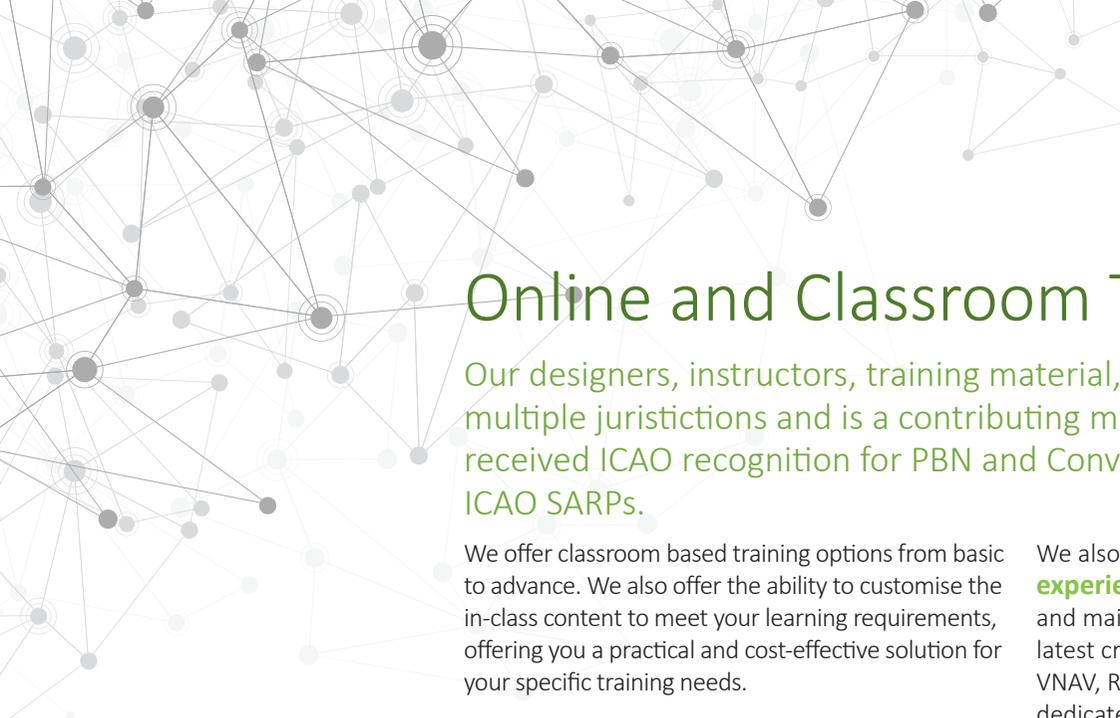
All Aeropath procedure designers are trained to the highest international standards. We operate in a variety of regulatory environments and the terrain we encounter is varied and challenging. Our customers include State regulators, ANSPs, Airlines and Airport Authorities. Our broad experience is reflected in our training, ensuring a great fit with your organisation's needs.

We have options for classroom based and online learning to suit your style and budget. We also offer standalone courses that teach fundamental skills and concepts beneficial to any aviation professional, such as Introduction to PBN and Obstacle Assessment.

All Aeropath training options can be supplemented with a unique mentoring package, where our industry leading designers come to your site to work with your team in their environment to consolidate their training.

Our courses and mentoring programs are delivered by active designers, so on the spot feedback can be offered and real-world solutions discussed. The working relationships that result from our approach ensure that your team remains part of a global network of design professionals.

Accelerate your PBN implementation with Aeropath Training.



Online and Classroom Training

Our designers, instructors, training material, and software are world class. Aeropath holds certifications from multiple jurisdictions and is a contributing member to ICAO's Instrument Flight Procedures Panel (IFPP). We have received ICAO recognition for PBN and Conventional procedures and our practices are aligned with the latest ICAO SARPs.

We offer classroom based training options from basic to advance. We also offer the ability to customise the in-class content to meet your learning requirements, offering you a practical and cost-effective solution for your specific training needs.

The duration of our classroom training varies, depending on the topic and experience of the participants. For example, a training package for **new procedure designers** can be completed in as little as 6 weeks and includes all the necessary subjects to start designing – General Criteria, Conventional Procedures, and Performance Based Navigation.

We also offer a range of advanced courses for **experienced designers** to enhance their skills and maintain their competency according to the latest criteria. Advanced courses include Baro-VNAV, RNP-AR, Point in Space, and a module dedicated to PANS-OPS recurrent training.

Instead of attending classroom sessions, your designers can enjoy learning at their own pace through our value-packed **online training** modules. Our interactive eLearning app provides a comprehensive range of subjects to choose from.

You pay only for what you need and can start your training at a time that suits you. Do you want to

use your iPad, Android or Windows tablet for added convenience? No problem, we've got you covered – our eLearning app runs on all platforms.

The following sections describe our online and classroom-based training options, including customised training, in more detail.

Online Training: Course Descriptions

We offer the following selection of courses in a self-paced, online, eLearning environment:

E-1: APV (BARO-VNAV)

E-2: RNP-AR

E-3: Helicopters (Point in Space) Procedures

E-4: Geodesy Refresher for Procedure Designers

E-5: PANS OPS Recurrent Course

E-6: Obstacle Assessment and Management

In Focus: Performance based Navigation (PBN)

Performance Based Navigation (PBN) specifies the system performance requirements for an aircraft operating RNAV or RNP defined in terms of accuracy, integrity, continuity and functionality required for the proposed operations in the context of a particular airspace concept, when supported by the appropriate NAVAID infrastructure.

Performance requirements are identified in navigation specifications, which also identify the choice of navigation sensors and equipment that may be used to meet the performance requirements. These navigation specifications provide specific implementation guidance for States and operators in order to facilitate global harmonization.

The PBN navigation requirements are first defined based on the operational requirements. Operators then evaluate options in respect of available technology and navigation services. A chosen solution would be the most cost-effective for the operator, as opposed to a solution being established as part of the operational requirements. Technology can evolve over time without requiring the operation itself to be revisited as long as the requisite performance is provided by the RNAV or RNP system.



E-1 | APV (BARO-VNAV)

This course describes the vertical component of the APV/Baro-VNAV procedure criteria.

The general criteria and Section 1, 2 and 3, as amplified or modified by criteria in this course, apply. Baro-VNAV approach procedures are classified as APV procedures in support of Type A 3D approach operations. They utilize a DA/H and not an MDA/H, and neither a FAF nor a missed approach point (MAPt) is identified. They use obstacle assessment surfaces similar to those for ILS, but based on the specific lateral guidance system. Baro-VNAV procedures are used in association with LNAV-only procedures. The LNAV-only FAF and MAPt are needed to define the lateral areas and to support the lateral guidance but they are not used for the vertical navigation function.

Prerequisites: Knowledge of General Criteria, Conventional Procedures and Performance Based Navigation.

Syllabus:

- APV (BARO-VNAV)
- Practical application

E-2 | RNP-AR

This course will cover RNP Authorization Required (RNP AR) as described in the ICAO Doc 9905.

Prerequisites: Knowledge of General Criteria, Conventional Procedures and Performance Based Navigation.

Syllabus:

- RNP AR – General Criteria
- RNP AR – Arrivals
- RNP AR – Intermediate and Initial Segments
- RNP AR – Final Approach
- RNP AR – Missed Approach
- Practical application

E-3 | Helicopters (Point in Space) Procedures

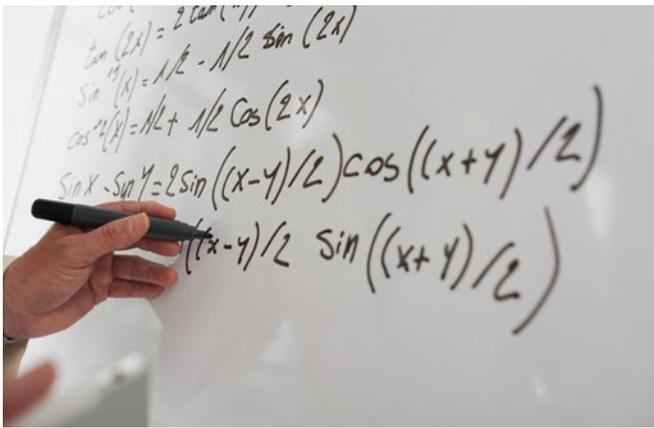
A specialised course that covers the general criteria and the modified area navigation (RNAV) approach procedure; applicable to helicopters only.

This course also covers the Point-in-space Approach and Departure procedures that consists of an instrument segment followed by a visual segment or vice versa. These specified procedures are designed by using the same conventional techniques and practices as for aeroplane categories.

Prerequisites: Knowledge of General Criteria, Conventional Procedures and Performance Based Navigation.

Syllabus:

- General Helicopter Criteria
- Point in Space Departure
- Point in Space Approaches
- Practical application



E-4 | Geodesy Refresher for Procedure Designers

The course has been developed to assist participants to refresh their algebra, geometry, trigonometry and geodesy skills.

We highly recommend this course for people that are not familiar with any of the course we provide. If you are not sure about your skills, please feel free to contact our training department, and we will send you a self-assessment test.

Prerequisites: None

Syllabus:

- Geodesy
- Projections
- Transformations

E-5 | PANS OPS Recurrent Course

This course will cover new amendments to PANS-OPS and future developments, and assess the impacts and associated risks on existing flight procedures or the implementation of new ones.

Prerequisites: Procedure design experience.

Syllabus:

- PANS-OPS changes last 24 months
- Future developments
- Customer-Specific Requirements
- PANS-OPS proposed changes
- Forum discussion

E-6 | Obstacle Assessment and Management

This course will provide airport operators or obstacle control personnel with the necessary skills to evaluate aerodrome obstacles from a practical perspective.

It describes different methods to efficiently evaluate obstacles within the vicinity of the airport including the straight segments of published flight procedures.

Prerequisites: None

Syllabus:

ICAO Annex 14

- Declared Distances
- Obstacle limitation surfaces
- Objects outside the obstacle limitation surfaces
- Obstacle Restriction and Removal
- Obstacle limitation requirements
- Modified OLS (State Requirements)

ICAO Doc 8168 (PANSOPS)

- VSS
- Missed approach (Straight)
- Aeronautical Data Quality requirements
- ILS (by clients request)
- Final/Intermediate straight segment up to 2000ft (Commencement Altitude)
- Practical application
- Departure (Straight)



Classroom-based Training: Course Descriptions

We offer the following selection of courses in an instructor-led, classroom environment:

Module I: General Criteria and Conventional Procedures

Module II: Performance Based Navigation (PBN) Procedures

Module III: RNP Navigation (Doc 9905) & BARO-VNAV

Module IV: Helicopters (Point in Space) Procedures

Module V: PANS OPS Recurrent Course

Module VI: Obstacle Assessment and Management

Module VII: PBN Implementation Planning Process

In Focus: Area Navigation (RNAV)

RNAV specifications do not require on board navigation performance monitoring and alerting. RNAV tracks will normally require monitoring by ATC surveillance systems to achieve desired performance and separation safety standards.

This requirement implies near universal surveillance coverage for RNAV specifications. In oceanic airspace this is provided by ADS-C, and in domestic airspace by a network of radar systems (PSR & MSSR). The surveillance of domestic airspace will also include Wide Area Multilateration (WAM) and ADS-B.

The current and legacy aircraft operations are suited for RNAV, however as a stand-alone specification it is insufficient to support many of the new Air Traffic Management (ATM) applications envisaged in strategic plans (e.g. 3D, 4D ATM concepts).



Module I | General Criteria and Conventional Practice

The course is based on PANS-OPS ICAO Doc 8168 Volume II Construction of Visual and Instrument Flight Procedures; it describes the essential areas and obstacle clearance requirements for the achievement of safe, regular instrument flight operations.

Prerequisites: Geodesy for procedure designers; if you are not sure we have a free self-assessment test.

Duration: 4 Weeks

Syllabus:

- Introduction to PANS-OPS Vol II & General Design Criteria
- Terminal Area Fixes and Tolerance
- Introduction to Non-Precision Approaches
- Non Precision Approach – Final Segment
- Non Precision Approach – Intermediate and Initial Segments
- Non Precision Approach – Reversal and Racetrack procedures
- Non Precision Approach – Missed Approach
- Conventional Holding Procedures
- Conventional Departures
- Circling Approach (Visual Manoeuvring)
- Minimum Sector Altitude (MSA)
- Conventional Departures
- ILS Precision Approach
 - Introduction and Principals
 - Surfaces
 - Obstacle Assessment
 - CRM
- Practical application

Module II | Performance Based Navigation (PBN) Procedures

This course will explain the components which are required for the construction of RNAV instrument flight procedures based on the Global Navigation Satellite System (GNSS).

Prerequisites: Knowledge of General Criteria and Conventional Procedures

Duration: 2 Weeks

Syllabus:

- RNAV changes introduced in November 2014
- RNAV – Missed Approach
- RNAV Holding Pattern
- RNAV – Arrivals
- TAA
- Proposed changes to PANS-OPS criteria
- RNAV – Final Segment
- RNAV Departure with transition
- RNAV – Intermediate and Initial Segments
- Practical application

Module III | RNP Navigation (Doc 9905) & BARO-VNAV

This Course describes the vertical component of the APV/Baro-VNAV procedure criteria.

Required Navigation Performance Authorization Required (RNP-AR) APCH operations are classified as approach procedures with vertical guidance (APVs). This type of operation requires a positive vertical navigation (VNAV) guidance system for the final approach segment (FAS). Baro-VNAV approach procedure are classified as AVP procedure, they utilize a DA/H and not an MDA/H, and neither a FAF nor a missed approach point (MAPt) is identified. They use obstacle assessment surfaces similar to those for ILS, but based on the specific lateral guidance system.

Prerequisites: Knowledge of General Criteria, Conventional Procedures and Performance Based Navigation.

Duration: 2 Weeks

Syllabus:

- APV (BARO-VNAV)
- RNP – Final Segment
- RNP – Missed Approach
- RNP – Arrivals
- RNP – Intermediate and Initial Segments
- Advanced RNP
- Practical application



Module IV | Helicopters (Point in Space) Procedures

A specialised course that covers the general criteria and the modified area navigation (RNAV) approach procedure; applicable to helicopters only.

It will also cover the Point-in-space Approach and Departure procedure that consists of an instrument segment followed by a visual segment or vice versa.

These specified procedures are designed by using the same conventional techniques and practices for aeroplane categories.

Prerequisites: Knowledge of General Criteria, Conventional Procedures and Performance Based Navigation.

Duration: 1 Week

Syllabus:

- General Helicopter Criteria
- Point in Space Departure
- Point in Space Approaches
- Practical application

Module V | PANS OPS Recurrent Course

This course will cover new amendments to PANS-OPS and future developments, and assess the impacts and associated risks on existing flight procedures or the implementation of new ones.

Prerequisites: Procedure design experience.

Duration: 1 Week

Syllabus:

- PANS-OPS changes last 24 months
- Future developments
- Customer-Specific Requirements
- PANS-OPS proposed changes
- Forum discussion

Module VI | Obstacle Assessment and Management

This course will provide airport operators or obstacle control personnel the necessary skills to evaluate aerodrome obstacles from a practical perspective.

It describes different methods to efficiently evaluate obstacles within the vicinity of the airport including the straight segments of published flight procedures.

Prerequisites: Background in Annex 14 / PANS-OPS.

Duration: 1 Week

Syllabus:

- ICAO Annex 14
 - Declared Distances
 - Obstacle limitation surfaces
 - Objects outside the obstacle limitation surfaces
 - Obstacle Restriction and Removal
 - Obstacle limitation requirements
 - Modified OLS (State Requirements)
- ICAO Doc 8168 (PANS-OPS)
 - VSS
 - Missed approach (Straight)
 - Aeronautical Data Quality requirements
 - ILS (by clients request)
 - Final/Intermediate straight segment up to 2000ft (Commencement Altitude)
 - Departure (Straight)
 - Practical application



Module VII | PBN Implementation Planning Process

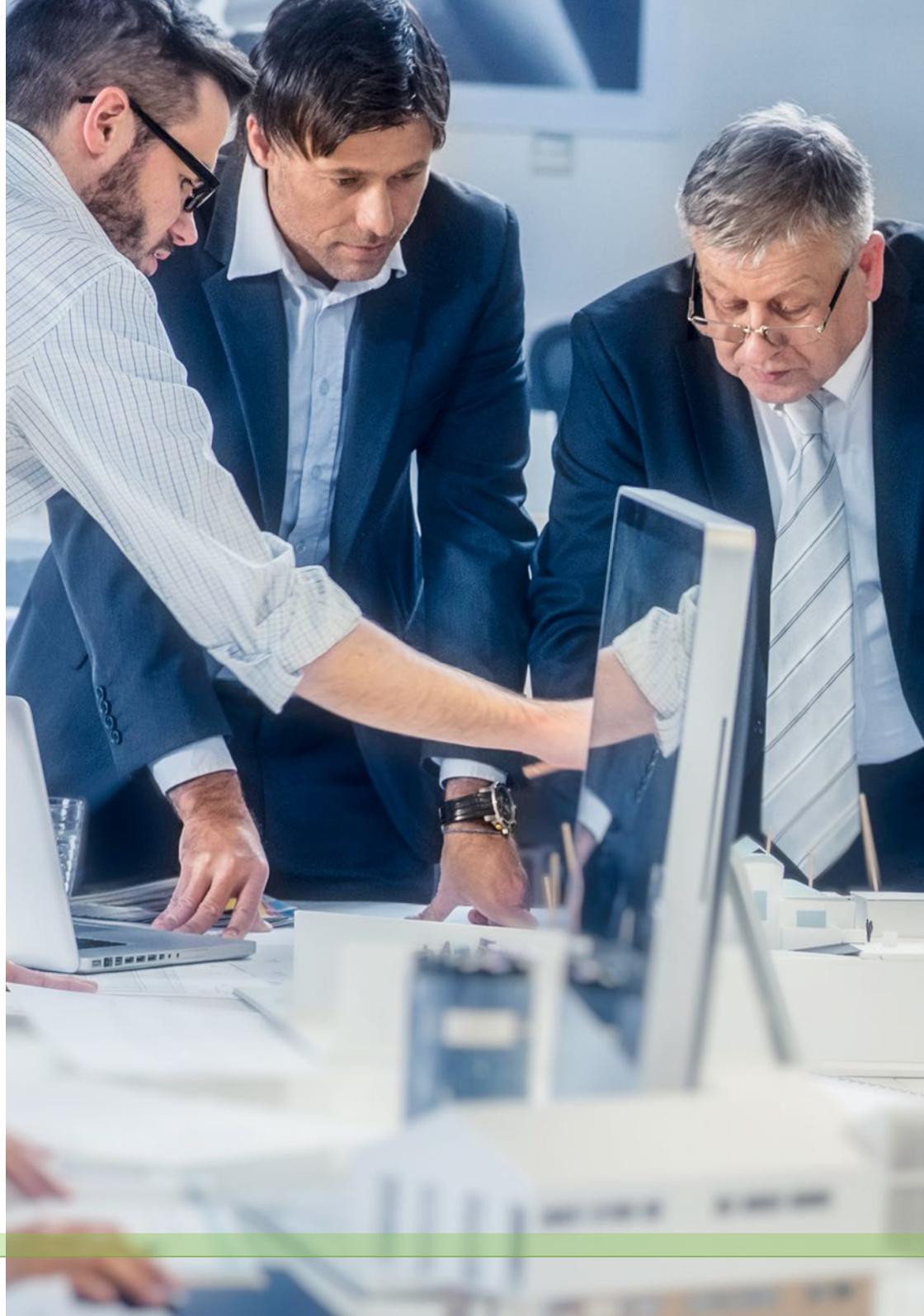
This course will cover the broad subjects and issues involved in PBN Implementation.

Prerequisites: Procedure design, air navigation service provider, regulatory or airline experience.

Duration: Varies per state

Syllabus:

- PBN Concept of Operations
 - What is PBN
 - Advantages
 - Prioritisation
 - Definitions
 - Navigation Specification
 - PBN Stage Selection
- PBN Consultation
 - Stakeholders
 - Local Issues
 - Flow Management
 - Communication
 - VFR Integration
 - Noise Contours
 - Scoping
 - Airline Perspective on PBN
- PBN Design
 - Nav Spec and Separations
 - Procedure Development for PBN
 - SID/STAR Development
 - Lateral Separations
 - Concept Design – DF/FF selection
 - Performance Benchmarking
 - Scoping
- PBN Implementation
 - Stakeholders
 - Regulatory Issues
 - Training
 - PBN SID/STAR Concept
 - Lateral Separations
 - Follow Up
 - Airspace
 - Documentation
 - Key Lessons



Customised Training and Mentoring

As you look through our training syllabus, you may find that you would like selected elements of one course combined with elements from others. You may also want to mix online training with customised classroom learning.

Please talk to our knowledgeable training experts and we will work with you to develop a training solution that meets your specific needs.

As an extension of our customised training, Aeropath can further support your Designers by working with you to develop a tailored mentorship programme.

Our Procedure Design instructors and technical leads can follow up with your recently trained Designers in a variety

of ways, including online support, peer review and feedback, and even visit your site to work with them in their own environment as they work on real-life tasks. Any of these mentoring activities will help consolidate learning with the experience of working on projects that matter to your organisation, all while under the guidance of our experienced Designers.

In Focus: Required Navigation Performance (RNP)

RNP specifications require on board navigation performance monitoring and alerting. This assures aircraft performance allows lower separation standards to be applied, and therefore ATC surveillance is not required. The on board navigation performance monitoring and alerting is a necessary enabler for many new ATM applications:

- **RNAV (GNSS) approach;** represents the application of RNP APCH navigation specification. This application can include APV where required and operationally feasible.
- **RNAV (RNP) approach;** represents the application of RNP AR navigation specification. Barometric VNAV is an integral part of this application.

Some of the RNP navigation specifications enable the application of more sophisticated functions available in RNP capable aircraft to further improve safety, reduce environmental impact and increase operating efficiency (e.g.: RNP-AR APCH).

Operational Benefits:

- Reduced track distance, noise and fuel consumption
- Reduced separation standards for air traffic routes
- Greater flexibility of airspace design in terminal areas
- Reduced environmental impact
- Increased airspace capability
- Increased airport accessibility
- Reduced infrastructure costs



To find out more about
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