



C Series

RNP RNAV Courses (Required Navigation Performance/Area Navigation)

Course Description

- RNAV – area navigation – increasingly dominates the method of navigation.
- We have to cope with different regulations in different parts of the world.
- The course gives an overview concerning RNAV.
- B-RNAV (basic area navigation) is what all aircraft nowadays are certified for and what all crews are normally permitted to execute without any special training.
- The course gives a theoretical overview about all aspects of RNAV.
- Beneath basic area navigation principles, Precision RNAV and RNP-RNAV are trained.

Aircraft Type

- C Series CS100 and CS300 (BD-500)

Course Goal

- The aim of the training is to fulfill the respective training requirements.

Course Structure and Duration (typical)

■ ■ Self-study WBT/CBT or classroom instruction ■ One FFS-Session 4.00 hours

■ Self-study / WBT □ Classroom ■ Training on system trainer ■ Practical training on FFS T Theoretical test T Practical test

Training Topics

Theoretical Training & Checking

- Theoretical training is performed using a state-of-the-art CBT program.
- The CBT program has been developed by Lufthansa Aviation Training and covers the theoretical basics of area navigation.

B-RNAV (Basic area Navigation)

- Track keeping accuracy +/- 5NM for at least 95% of the flight time
- Inputs from VOR/DME, DME/DME or GNSS and/or INS
- B-RNAV used en-route and for connection to terminal areas
- B-RNAV limited to RNAV procedures above MSA, designed according to en-route principles

P-RNAV (Precision RNAV)

- Track keeping accuracy +/- 1NM for at least 95% of the flight time
- Inputs from VOR/DME, DME/DME or GNSS and/or INS (for a limited time)
- P-RNAV used for navigation in terminal areas (obstacle clearance granted, when P-RNAV requirements are met) for:
 - Arrivals, departures; and
 - Approaches up to the FAWP (final approach waypoint).

RNP-RNAV (Required Navigation Performance for Area Navigation)

- Final step for a global area navigation
- Functionality and integrity for all phases of flight, including approaches
- Track keeping accuracy to prescribed RNP values
- Typical RNP values
 - RNP 0.3NM
 - RNP 0.1NM
- Several aviation authorities started to publish RNAV approaches overlaying conventional non-precision approaches.
- These approaches must not be mixed up with (stand-alone) RNP-approaches.
- They simply enable crews to let the RNAV-system navigate the aircraft also during the approach, with conventional navigation additionally available to constantly monitor the approach progress.
- Overlay approaches:
 - Any RNAV system meeting minimum requirements
 - Overlaying a conventional approach
 - Conventional navigation permanently available
- RNAV (GPS) approaches:
 - Precision RNAV required
 - GPS required to achieve this specific NAV performance
 - Stand-alone approach (no reference to ground navigational aids)

The following table gives a final overview to this complex topic and indicates when additional training is required:

Phase of Flight	Minimum RNAV System	Operation below MSA approved?	Required NAV Performance	Special Training required?
EN-ROUTE	B-RNAV	NO	± 5,0 NM	NO
TERMINAL AREA	P-RNAV	YES	± 1,0 NM	YES *)
FINAL APPROACH	RNP-RNAV	YES	± 0,3 NM	YES *)

*) Note: FTA instructors are competent to deliver respective special training.

Practical Training & Checking

- The practical training is performed during one four-hour FFS mission.
- Every pilot performs four RNAV approaches as PF and four RNAV approaches as PM.
- Approaches are performed with and without system malfunctions.
- RNAV competence is not addressed during a type rating skill test.
- Consequently, there is no requirement to perform RNAV approaches during a skill test.