

Chapter 7 AIRCRAFT QUALIFICATION

1. Eligibility

In the process of issuing an operational approval for PBN, it is necessary to establish that the aircraft and its navigation and other systems are suitable for the specific operation. For conventional navigation, rules and processes exist for the design, manufacture, certification and operation of navigation systems in accordance with well established standards and practices. For PBN operations it is less likely, especially given the recent development of the PBN Manual and State regulatory documentation, that an aircraft is approved in the state of manufacture in accordance with the requirements of a particular navigation specification. Consequently it is often necessary to authorise PBN operations without the benefit of complete airworthiness approval documentation, and this is an important step in the operational approval process. It is important to understand that the lack of specific airworthiness certification does not imply any lack of capability. All operational aircraft will as a matter of course be “airworthy” in the general sense, however the specific airworthiness with regard to a particular PBN operation may not have been completed. In such cases it is necessary to demonstrate that the aircraft is suitably equipped and capable of the PBN operation. The terms “certification” and “approval” should be used appropriately, and care needs to be taken not to confuse the two.

Operational approval needs to consider the capability, functionality, performance and other characteristics of the navigation and other relevant flight systems against the requirements of the particular PBN operation and determine that the operation is sound. In some cases operational mitigations and alternative means of meeting the PBN Manual requirements may need to be examined and approved.

The term eligibility is used to describe the fundamental aircraft capability, however considerable additional evaluation may be needed before an eligible aircraft is determined to be adequate for the issue of an operational approval.

Following the development of the PBN Manual and relevant State regulatory material, a number of manufacturers have or are in the process of obtaining airworthiness approval for PBN operations. In such cases the operational approval process can be greatly simplified. It is expected that in due course manufacturers will pursue PBN Manual compliant airworthiness approvals both for new and previously certified aircraft.

A considerable number of aircraft may never, for engineering, economical or practical reasons, be able to obtain airworthiness approval consistent with all PBN Manual navigation specifications. Despite this, operational approval is frequently able to be achieved, by the implementation of operational limitations, specific operating procedures, data collection, systems evaluation or trialling.

2. Aircraft Evaluation

The AFM will commonly include a statement of RNAV or RNP capability, which often leads to the assumption that the aircraft is approved for a particular PBN operation. Unfortunately the basis upon which a statement is included in an AFM is often not consistent with the PBN

Manual, as many of the terms, requirements, operating practices and other characteristics either differed or did not exist at the time the AFM was issued.

Consequently, unless the aircraft AFM specifically references relevant State airworthiness documents consistent with the PBN Manual, additional information will need to be obtained to evaluate the relevance of the AFM statement.

In order to support PBN operational approval a number of manufacturers provide additional information to support claims of PBN Manual compliance and capability. Such supporting documentation may or may not be approved or endorsed by the State of manufacture, and it may be necessary to contact the relevant authority to validate the manufacturer's claims.

It should also be noted that operational philosophies differ particularly in the management of non-normal events, and that an airworthiness or operational approval granted on one State may not be consistent with the practice in another region. For example in the US greater emphasis is placed on crew procedures in the management of non-normal events, whereas in Europe emphasis tends to be placed on engineering solutions.

3. Functionality

An area of aircraft capability that generally involves some attention during the operational approval process is the evaluation of navigation functionality, and cockpit control, display, and alerting functions. Many area navigation systems were designed and installed at a time when some of the PBN applications were not envisioned, and the need for certain functionality was not considered necessary. These circumstances do not mean that the installed equipment is not capable of PBN operations but in some cases the design is such that the minimum requirements of the PBN Manual may not be available as installed.

For example, a cross-track indication in the form of a Course Deviation Indicator (CDI) or Horizontal Situation Indicator (HSI) enabling accurate monitoring of cross-track deviation may not have been considered necessary at the time of certification. An avionics upgrade may be available to meet the later requirements of the PBN Manual, but in some aircraft for a variety of technical or economic reasons this may not be possible.



Figure 7.1: Cross-track and Vertical Deviations shown on Control and Display Unit

The aircraft evaluation therefore needs to consider the options available to meet the intent of the PBN Manual navigation specification, in circumstances where the specified functionality may simply be unavailable. In the example above (CDI), the objective is to ensure that a particular level of cross-track accuracy can be monitored and if alternative means are available, such as a crew procedures to monitor another source of cross-track deviation, then operational approval should not be unreasonably withheld.



Fig 7.2: Example of cross-track deviation display in $1/10^{\text{th}}$ NM

In determining that the alternative means is acceptable, the applicant may be required to demonstrate (e.g. in a simulator), that the procedure is satisfactory, taking into account all other relevant factors. Alternatively some operational limitation (e.g. limiting RNP) may be applied in order to demonstrate an equivalent level of safety.

For more detail refer to Part 2 for functionality associated with individual Navspecs.