

Required navigation performance

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A new approach to navigation, now implemented in the Tasman Sea area and the northern and central Pacific, delivers increased traffic capacity. But navigation systems must meet improved standards.

THE INTERNATIONAL CIVIL AVIATION Organization (ICAO) has adopted a new approach to navigation – dubbed required navigation performance (RNP) – which makes better use of the enhanced accuracy of newer navigation technologies.

RNP 10, which has a navigation performance accuracy of 10nm within the designated airspace, was implemented by Australia and New Zealand in April this year for the Tasman Sea area. The US implemented the standard in the northern and central Pacific areas at the same time.

The new category reduces the minimum lateral separation requirement from 60nm to 50nm. Flights between Lord Howe Island and the Australian mainland at or below FL250 are exempt from the new standard.

RNP 10 allows increased traffic with reduced separation standards, provided 2 approved long-range navigation systems are available. To meet RNP 10 requirements, an aircraft must be able to navigate within a cross-track and along-track tolerance of 10nm for 95 percent of the total flying time.

RNP has been defined by ICAO as “a

statement of the navigation performance accuracy necessary for operation within a defined airspace”. It is identified by a type number which specifies the accuracy value, expressed in nautical miles, associated with the RNP airspace. Details of RNP 10 airspace are outlined in AIP SUP H6/98.

Benefits of RNP: Reduced separation minima, brought about by the ability of aircraft to conform to RNP criteria, provide a range of benefits:

- Aircraft are able to use optimum cruising levels for longer periods of time, which reduces fuel burn and hence reduces operating costs.
- Air traffic management is enhanced, so Air Traffic Control is able to accommodate greater numbers of aircraft within a particular volume of airspace.
- Air traffic coordination and procedures are standardised, which improves safety as a result of States using the same RNP approvals process and separation minima.
- RNP provides a world-wide standard for navigation requirements. Thus, an RNP 10 approval given by one State can be used anywhere in the world where RNP 10 airspace is designated.

Approval for RNP 10: Many aircraft and navigation systems currently in use in oceanic or remote area operations will qualify for RNP 10 based on one or more provisions of existing certification criteria. Therefore additional aircraft certification action may not be necessary for the majority of RNP 10 approvals. In these cases, additional aircraft certification will only be needed if the operator chooses to claim additional performance beyond that originally certified or stated in the aircraft flight manual, and the operator cannot demonstrate the desired performance through a data collection process.

Equipment requirements: All aircraft operating in RNP 10 oceanic and remote airspace, except where authorised by CASA, must be equipped with at least 2 independent and serviceable long range navigation systems (LRNS). Currently, inertial navigation/reference systems are the only approved sole means LRNS. However, subject to the applicable standards, and when fitted in accordance with civil aviation advisory publication (CAAP) RNP 10-1, GPS meets the primary

means navigation requirements for oceanic and remote airspace, and is suitable for operations in RNP 10 airspace. Australia has approved the use of a single TSO C-129 GPS as a primary-means LRNS for domestic airspace only.

Aircraft equipped with dual or triple inertial navigation systems, or a combination of a single inertial system and a single GPS approved for primary-means of navigation, or radio navigation positioning updating and electronic map displays, will generally meet all of the RNP 10 requirements for up to 6.2 hours of flight time.

This time starts when the systems are placed in the navigation mode or at the last point at which the systems are updated.

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The 6.2 hours of flight time is based on an inertial system with a 95 per cent radial position error rate (circular error rate) of 2.0nm/hr which is statistically equivalent to individual 95 per cent cross-track and 95 per cent along-track position error rates (orthogonal error

rates) of 1.6015nm/hr each, and 95 per cent cross-track and 95 per cent along-track position error limits of 10nm each (10nm/1.6015nm/hr = 6.2hrs).

Some Litton and Honeywell triple mix inertial navigation/reference systems have been approved for more than 6.2 hours.

Operational approval process: The steps to gain operational approval from CASA are:

- Aircraft equipment eligibility for RNP 10 must be approved by CASA (contact your nearest CASA district office). The approval process is outlined in civil aviation advisory publication, RNP 10-1.
- Flight crew training and operating procedures for the navigation systems to be used should be identified by the operator.
- The operator database use, flight crew training and operating procedures must be evaluated by CASA.

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