

Towards zero accidents

Technological developments could usher in a new era of safety, writes John Mulcair.

AN ELECTRONIC COCOON enveloping airliners throughout their journeys offers the next major step in delivering public expectations of zero accidents.

Robert Matthews, lead safety analyst of the US Federal Aviation Administration's office of accident investigation, described required navigation performance, or RNP, as the best contemporary safety advance also offering compelling economic benefits to carriers.

RNP uses laser inertial reference systems updated by ground and satellite navigation data to allow a high degree of navigational accuracy.

Matthews was addressing a recent conference of the International Society of Air Safety Investigators, held on Queensland's Gold Coast.

He said aviation professionals agreed that fatal accident rates had stabilised at such low levels that further improvements would be incremental.

However, he argued that the world had entered another period of significant reduction in the fatal accident rate, and the improvement would accelerate.

The changes would be built on technology connected by two primary themes. The first was increasing precision in areas such as navigation, aircraft handling and engine tolerances. The second was an economic compulsion for carriers wishing to compete in key markets to have the precise navigation capabilities associated with global positioning systems and RNP.

Matthews said the challenge was to achieve a significant and sustained reduction in the already low fatal accident rate, rather than imperceptibly gradual improvements.

He suggested four factors might produce this: fleet turnover, new analytical capabilities with routine operational data, a change in the industry-government relationship that enabled the entire community to focus on areas of highest risk, and "perhaps the most revolutionary of all", RNP.

The fourth generation of jets, such as the A320 family and the Boeing 777, are



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already in service with the A380 and the Boeing 7E7, the most automated in history, to come.

Improvements in computer capacity, analytical software and data displays has resolved objections about capacity to analyse mountains of data from daily operations.

Compelling benefits: In 1997, a Civil Aviation Safety Team (CAST) with US government and industry members, after a slow start, successfully addressed controlled flight into terrain accidents, loss of control, approach and control accidents and near mid-air collisions, while building intellectual and professional trust.

But Matthews believes despite these advances, RNP, with its compelling economic benefits, will penetrate the world's airliner fleets rapidly.

RNP is an evolution of area navigation, defined by ICAO and the FAA as "a method of navigation that permits aircraft operation on any desired flight path within the coverage of station-referenced navigation aids or within the limits of the capability of self-contained aids, or a combination of these." RNP applies to "self-contained aids, or a combination of self-contained and ground-based navaids".

Matthews explained RNP brought its own self-contained system to all phases of flight and to any point in the world. Any

aircraft with dual inertial navigation, dual GPS and dual FMS would be able to go anywhere, provided the aircraft had an adequate database.

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In the terminal area, maximum runway capacity was relatively modest because of its systems. Similarly en route, aircraft basically flew fixed routes from one navaid to the next, with sometimes enormous separations.

CAST, its members and the Flight Safety Foundation, focused in relation to RNP on stabilised approaches, minimising the use of non-precision or step-down approaches, establishing constant angle approaches where precision approaches were not available and establishing go-around gates.

Matthews said the world's airliner fleet already included aircraft that are RNP-capable.

Yet some barriers could limit or delay introduction: large parts of the aviation community would still require ground-based navaids, while there would be concerns about wake turbulence on closely spaced runways with simultaneous operations.

Some carriers may be slow to incorporate RNP requirements into their fleets, which may compel civil aviation authorities to emphasise the economic benefits. At busy airports at peak times, access may be limited to RNP-capable aircraft.

Several RNP procedures have been designated, with some Pacific routes where lateral separation of flight tracks has been reduced to 50 nautical miles.

RNP will open huge portions of air space obligated to separation; carriers can expect more precise flight profiles; and safety will be improved with lower risk of CFIT, loss of control or other types of approach and landing accidents, as well as accidents on takeoff and climb out.

— John Mulcair is a former aviation writer for *The Australian*. The next issue of *Flight Safety Australia* will feature RNP.