



Credit: CADS

# Embracing new challenges

Li Tin-Chui, Simon, Director General of Civil Aviation in Hong Kong, describes the ANSP's work to increase capacity at Hong Kong International Airport and the complete revamp of its systems.

In an effort to cope with the ever-growing air traffic volume and demand for air navigation services, the Civil Aviation Department (CAD) of Hong Kong, China – which is responsible for the provision of air navigation services within the Hong Kong Flight Information Region (HKFIR) – is committed to continuous ATM modernisation.

To better manage the large air traffic demand, CAD is actively collaborating with States and administrations in the region to implement cross-border Air Traffic Flow Management, based on the Distributed Multi-Nodal ATFM network concept.

This is in line with the International Civil Aviation Organization (ICAO) Global Air Navigation Plan (GANP) and the associated Aviation System Block Upgrade (ASBU) framework.

CAD has launched a series of initiatives to upgrade the necessary air navigation infrastructure and procedures and, at the same time, endeavours to fulfil its duties in collaboration with ICAO Regional Office and other Asia-Pacific States and administrations to enhance regional air navigation safety, capacity and efficiency.

### Three-runway system

As rightly forecasted by ICAO and the International Air Transport Association (IATA), the Asia-Pacific region has been experiencing continuous air traffic growth in recent years.

This is demonstrated by the increasing air traffic movements not only in and out of Hong Kong International Airport (HKIA), but also overflying the HKFIR.

In 2016, on average CAD handled about 1,132 daily movements at HKIA and about 771 daily overflights. These figures represent a 48% and 94% increase respectively, compared with 2006.

To help handle this volume, CAD has been working in collaboration with the Airport Authority Hong Kong (AAHK) to achieve the maximum runway capacity for HKIA over the past few years.

Through implementing various ATM optimisation measures, CAD has managed to increase the aircraft movements per hour at HKIA to 68, the maximum practical capacity for the existing two-runway system.

As HKIA edges closer to full capacity with the existing two-runway system, CAD is working earnestly with the AAHK and providing technical advice on the planning and development of a third runway. According to AAHK's plan, the three-runway system (3RS) will be in operation by 2024.

## Out with the old

Another important project that CAD has undertaken in recent years is the replacement of its air traffic control system. This massive venture consists of replacing and relocating all ATC facilities, namely the Aeronautical Network Centre (ANC), the Aeronautical Information Management Centre (AIMC), the Air Traffic Control Centre (ATCC), the Aerodrome Control Tower (Tower) and the Rescue Coordination Centre.

After about five months of phased functional implementation, the Air Traffic Management System (ATMS), the centrepiece of the new ATC system, commenced full operations on 14 November, 2016.

The new ATMS is able to handle 8,000 flight plans per day and simultaneously monitor 1,500 air or ground targets, a fivefold and 1.5 increase respectively compared with the original system. The increased capacity makes the new system capable of coping with the projected air traffic growth brought about by the planned expansion of HKIA into 3RS.

The new ATMS has many enhanced features, including multiple layers of redundant systems to provide fail-safe, immediate backup. Naturally, it comes complete with the latest information technologies, including highly productive flight information and data processing capabilities, advanced automatic safety net features, more precise flight trajectory prediction functions, multi-

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surveillance tracker technology and graphical presentation of current and predicted meteorological information. In addition, the new ATC system has incorporated into its design the capability for system upgrading and expansion to cope with future traffic growth.

## Performance-based navigation

Performance-based Navigation (PBN) implementation is identified as the highest priority in the ICAO GANP. In light of its importance, CAD has formulated its PBN implementation plan in line with the global and regional roadmap.

CAD has implemented PBN approach procedures with vertical guidance (APV) for all instrument runways. It has also designed environmentally-friendly PBN approaches that avoid overflying noise sensitive areas, and a set of noise mitigating departure procedures, which take advantage of the capability of a Radius-to-Fix (RF) turn so that aircraft

can be kept on well-defined flight paths and distances. This confines the noise footprint, thereby protecting the populated residential areas.

CAD has also used Required Navigation Performance (RNP) 1 standard departure and arrival (SID/STAR) procedures at HKIA since 2013. The RNP 1 procedures have completely replaced conventional procedures and become mandatory for aircraft operating at HKIA since 12 November, 2015. The successful implementation of RNP 1 will facilitate the future adjustment of flight paths and flexible airspace design, thereby offering operational benefits including enhanced airspace efficiency.

## Good collaboration

With the aim of improving operational efficiency through the increased exchange of real-time operational information among aviation community stakeholders, CAD successfully rolled out the Airport Collaborative Decision Making (A-CDM) platform in July 2013 with very encouraging results. An enhanced version of A-CDM is now being developed by the AAHK to realise the full benefits of the system to improve airport operations and capacity.

On a wider scope, to better manage the large air traffic demand, CAD is actively collaborating with States and administrations in the region to implement cross-border Air Traffic Flow Management (ATFM), based on the Distributed Multi-Nodal ATFM network concept. This has been endorsed by



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The Civil Aviation Department of Hong Kong is committed to continuous ATM modernisation.

the Asia-Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) as the foundation for a cross-border solution in the Asia-Pacific region by providing stakeholders with greater situational awareness and involvement in the decision-making process.

Another new technology being embraced is automatic dependent surveillance - broadcast (ADS-B). CAD has been fully supporting ADS-B development in the region. Since 8 December 2016, all aircraft flying within HKFIR at or above FL290 are required to have the requisite ADS-B avionics in the cockpit.

To reap the benefits of enhanced surveillance, the new ATMS is fed with ADS-B data for operational use. Including ADS-B as an additional ATS surveillance source will enhance the contingency and redundancy capabilities of the ATMS.

Furthermore, the implementation of ADS-B in the entire region will eliminate gaps in ATS surveillance coverage, which facilitates more seamless and interoperable operations among ANSPs.

To further augment the tracking accuracy of aircraft arriving at HKIA using the Global Navigation Satellite System (GNSS), CAD has conducted a preliminary siting study in preparation for installing a ground-based augmentation system at HKIA. A territory-wide satellite database has been established by combining the real-time data collected by local GNSS monitoring stations located around the territory.



Revamped systems will help handle increasing demand.

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Moreover, CAD has started using an Ionospheric Scintillation System, which enables collaboration with neighbouring areas through the ICAO Ionospheric Studies Task Force. This studies possible ionospheric effects on GBAS performance and potential mitigating measures leading to the successful deployment of GBAS in the Asia-Pacific region. CAD will continue GBAS trials at HKIA and the implementation of GBAS in the next few years.

### Moving forward

The 70th anniversary of the establishment of CAD was marked in 2016. Having evolved from its infancy located at a small piece of reclaimed land at Kai Tak to the ever-growing land at Chek Lap Kok, HKIA has become

one of the busiest passenger and cargo airports in the world.

To cope with the robust growth in air traffic, CAD has taken on great responsibility and will inevitably face challenges. But it will continue to work with all stakeholders in the aviation industry to pursue ATM modernisation. The aim is to build aviation capability by increasing capacity, improving safety and enhancing efficiency. And this must be done while also minimising the environmental impacts of civil aviation.

Stepping into our 71st year, CAD has become a member of CANSO in the Asia-Pacific region. This marks a significant milestone as the company moves forward towards embracing new challenges in air navigation. CAD certainly treasures this golden opportunity to foster closer collaboration with other regional ANSPs on ATM issues through the platform provided by CANSO.

Achieving global harmonisation and the interoperability of air navigation service provision in the Asia-Pacific region remains CAD's goal. ➔



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