International Civil Aviation Organization

Sixth Meeting of the Asia/Pacific Air Traffic Management Automation System Task Force (APAC ATMAS TF/6)

Bangkok, Thailand 2-4 June 2025

Agenda Item 5: ATM Automation System Implementation Experience by States

5.6 Development of New Technology

APPLICATION OF AMDB IN TOWER ATM AUTOMATION SYSTEM

(Presented by CHINA)

SUMMARY

The Airport Mapping Database (AMDB) has achieved the digital storage of high-precision geographic information and operational data for airport elements. This paper introduces the application of AMDB in Tower ATM automation system (Internationally, it is referred to Integrated Tower System), which enables users such as tower controllers and apron controllers have a shared situational awareness.

1. INTRODUCTION

1.1 Air service non-suspend construction refers to the implementation of engineering construction within the movement area while the airport is remains operational, or when part of the area is closed during certain periods, and aircraft departing and arriving according to the schedule. This special construction method faces numerous risks and challenges. For example, there is mutual interference between the construction work activities and flight operations.

1.2 Tower controllers and apron controllers need to accurately grasp the situation of the pavement construction so as to formulate relevant safeguard plans and prevent targets such as aircraft and vehicles from mistakenly entering the construction area.

1.3 Before Tower ATM Automation System started using the Aerodrome Mapping Database (AMDB), The airport pavement maintenance department provides information on air service non-suspend construction by fax. When receiving the air service non-suspend construction information from the airport pavement maintenance department, the tower controller requires to do extensive data entry and verification.

1.4 AMDB provides digital storage of high-precision geographic information and business data for airport elements，such as runways, taxiways, parking stands, lights, obstacles, and taxiing routes. It has transitioned traditional airport information from being human-readable to system-interpretable, which enable unified support for aerodrome surface information sharing among relevant stakeholders.

1.5 China actively promotes the application of AMDB technology in aerodrome control service.

2. DISCUSSION

2.1 Tower controllers use Tower ATM Automation System for aerodrome control service, while apron controllers use apron management system for apron control service. Generally, Computer Asistant Design（CAD） drawings are used as the data source for the surface map information of the systems.

2.2 CAD drawings provided by design units during the construction, expansion, or renovation of airports primarily serve civil engineering design purposes and are not specifically tailored for air traffic control service. These drawings may exhibit incomplete descriptions of certain scene elements or insufficient accuracy to meet the stringent requirements of air traffic control. For instance, issues such as missing taxiway numbers or inadequate overall precision may arise.

2.3 There are differences in the design of Tower ATM automation system and apron management system, and the identification and processing of CAD drawings are also inconsistent, which affects the transmission of air service non-suspend construction information.

2.4 The information of air service non-suspend construction requires collaborative decision-making and information sharing among various stakeholders at the airport, including a wide range of individuals including flight crew members, tower controllers, ground vehicle operators, construction and maintenance workers, cargo airlines, and general or business aviation operators. All of them must work together to ensure airport safety and efficient flight operations. The sharing of air service non-suspend construction information relies on the use of unified data standards by the systems used by various aerodrome stakeholders.

2.5 AMDB provides the digital storage of high-precision geographic information and business data for airport runways, taxiways, parking bays, lights, obstacles, taxi routes, and other elements, also provides data standards for information sharing during air service non-suspend construction.

2.6 Tower ATM automation system has been upgraded to support AMDB as the system map and incorporating it into internal system calculations. Based on this, tower controllers and apron controllers, focusing on the operational needs, have jointly established data items and processes for pushing air service non-suspend construction information, using AMDB as the data standard.

2.6.1. Once the mapping and information updates are completed by the airport pavement maintenance department, AMDB is pushed to Tower ATM automation system via the Ethernet data interface.

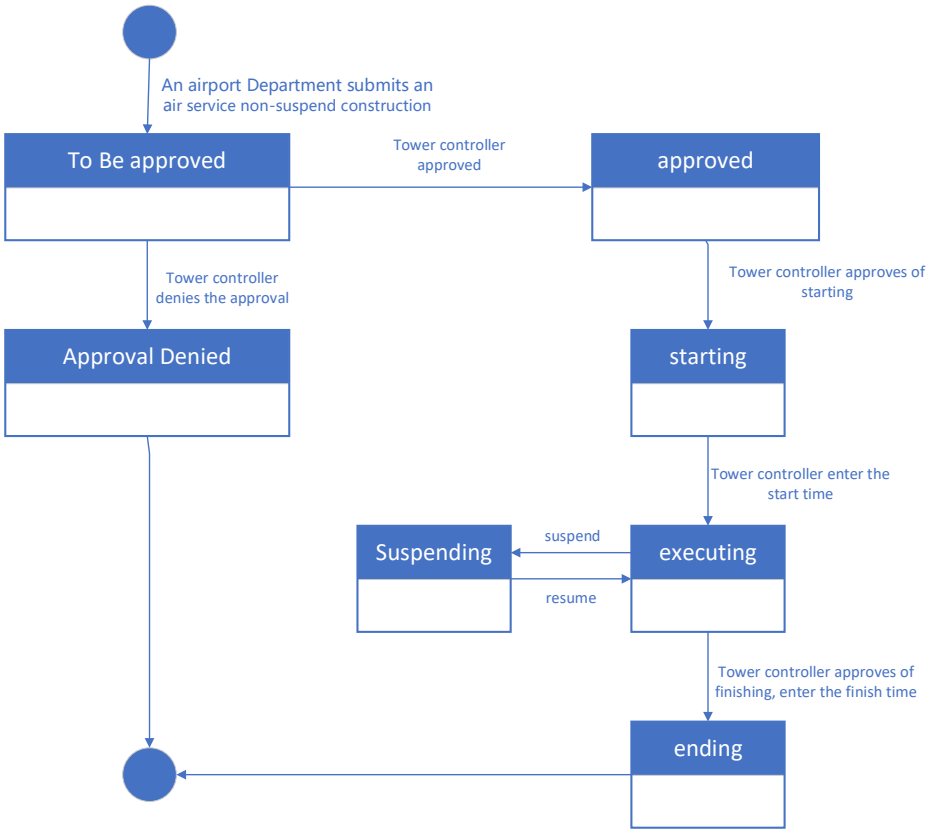

Figure 1 Approval Process of the Air Service Non-suspend Construction

2.6.2. Before an air service non-suspend construction is carried out on a certain pavement, the construction area and planned time of the pavement are marked on the AMDB by the airport pavement maintenance department, and then pushed to tower controller for verification via the data interface.

2.6.3. Tower controller verifies the construction area and time.

2.6.4. If the operational requirements are not met, an approval rejection message will be sent by the air traffic control to the airport pavement maintenance department, and the construction will be cancelled.

2.6.5. If it is deemed feasible by the air traffic management assessment, the approval will be granted, and the information about the air service non-suspend construction will be pushed to Tower ATM automation system.

2.6.6. After Tower ATM automation system receives the construction plan, when the start time of the construction is approaching, it will give a prompt on the human-machine interface. As shown in Figure 2, the system uses unfilled frames to mark the construction area that is about to take effect.

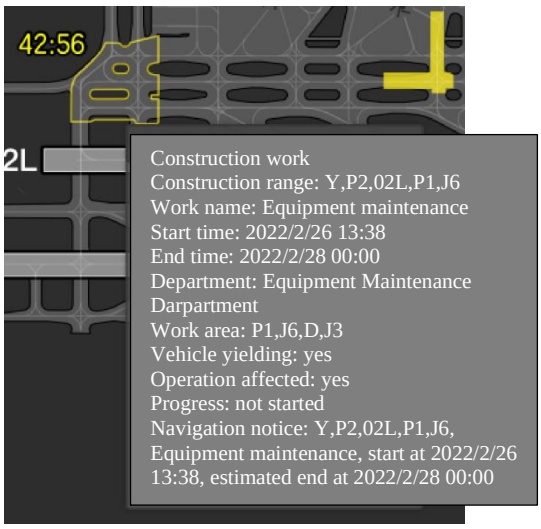

Figure 2 Construction Information Shown in the HIM

2.6.7. After tower controller confirms the start of the construction and enters the actual start time, the construction status will be pushed to the relevant systems of the airport side through the data interface. And in the human-machine interface of Tower ATM automation system, the construction area will be filled with yellow color to indicate the area where the construction is in progress.

2.6.8. During the construction process, the tower controller can suspend the construction, resume it, or end it. These statuses will also be pushed to the relevant systems of the airport side through messages.

2.7 Due to the adoption of the AMDB to transmit the information about air service non-suspend construction, tower controllers, apron controllers, airport construction workers, and other personnel can accurately view the area information and time information in their respective systems, thus establishing a common situational awareness of the airfield pavement construction.

2.8 The information about air service non-suspend construction pushed through the data interface are not only displayed on the human-machine interface of Tower ATM automation system, but also involved in the functions of the system such as conflict alert calculation and route planning calculation.

2.8.1. When an aircraft approaches or is about to enter the construction area, the system will generate an alarm prompt. As shown in Figure 3.

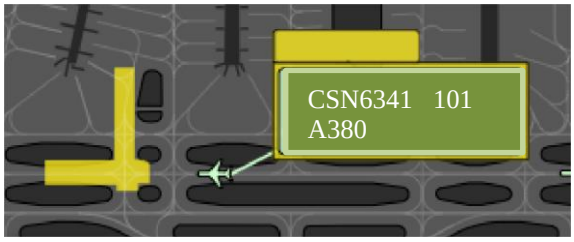

Figure 3An Alert Triggered When An Aircraft Nears the Construction Area.

2.8.2. When a tower controller plans the taxiing route for the aircraft, the system automatically determines the effectiveness of the construction area during airport operation and gives real-time prompts to the user.

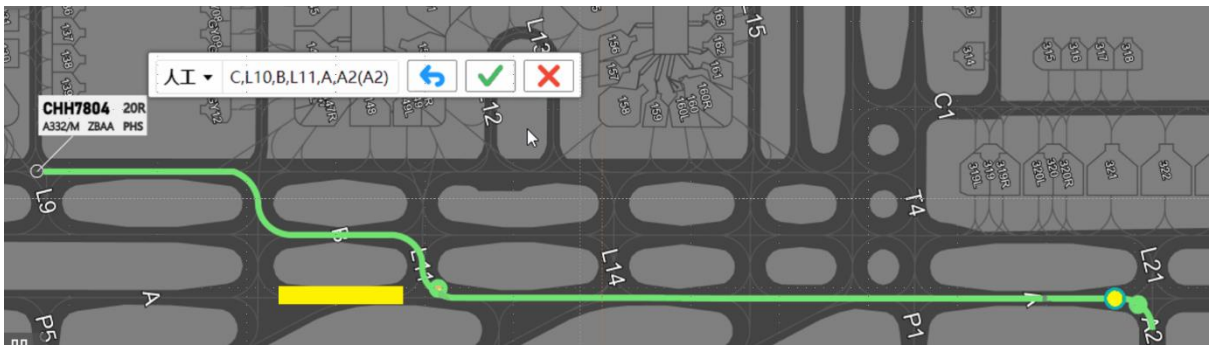

Figure 4 Route Planning Automatically Bypasses the Construction Area

2.9 Compared with CAD drawings, AMDB is more refined and comprehensive, achieving the transformation from the traditional airport intelligence materials being "seen" by people to being "seen" by the system. It provides powerful data support capabilities for the business systems of relevant airport parties such as air traffic control and the apron. It also lays a solid foundation for the common situational awareness of all parties involved in aerodrome operations based on "a unified operation map", which is conducive to promoting the digital development of aerodrome stakeholders.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper; and

b) discuss any relevant matter as appropriate.

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