International Civil Aviation Organization

Fourth Meeting of the Asia/Pacific Air Traffic Management Automation System Task Force (APAC ATMAS TF/4)

Bangkok, Thailand, 28 – 30 June 2023

Agenda Item 4: ATM Automation System Implementation Experience by States

4.3 Integration with External Systems

IMPLEMENTATION OF DATA INTERACTION BETWEEN A-SMGCS AND ATFM SYSTEM

(Presented by China)

SUMMARY

This paper presents data exchange between Advanced Surface Movement Guidance and Control System and Air Traffic Flow Management system at Beijing Daxing International Airport, introduces the processing of each system, also shares the benefits of this interface.

1. INTRODUCTION

1.1 A-SMGCS is the main airport surface management system of the Beijing Daxing International Airport. However, controllers need to manually check flight COBT, CTOT and restricted conditions in the Air Traffic Flow Management (ATFM) system.

1.2 To streamline the equipment-operation procedure and reduce the workload of controllers, bi-directional data exchange between A-SMGCS and the ATFM system has been implemented. Traffic flow data can be processed and displayed in the A-SMGCS, which ultimately enhances air traffic control efficiency.

2. DISCUSSION

Data Exchange

2.1 The A-SMGCS integrates traffic flow data by using a TCP/IP protocol with dual redundant linkages.

a) To ensure real-time data updates and lessen system load, the ATFM system sends full data at a fixed time every day and incremental data at a fixed interval.

b) ATFM system subscribes flight and runway data from A-SMGCS based on requirement. Whenever there is a change in the subscribed data field in A-SMGCS, it will be transmitted to the ATFM system in real-time.

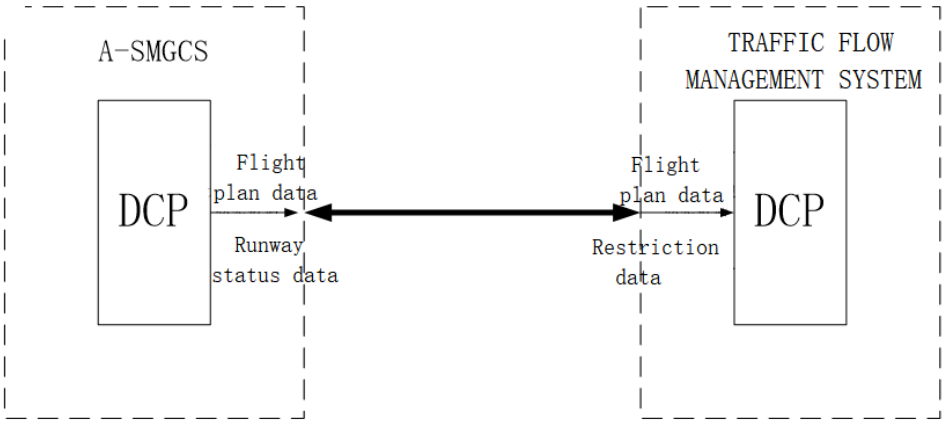

Fig.1 Diagram of System Connection

2.2 Data Types

a) ATFM system provides two types of data, flight plan data and flow control restriction data, to the A-SMGCS.

- Flight plan data includes ACID、ADEP、ADES、SOBT、EOBT、COBT 、CTOT and restriction identifiers.
- Restriction data includes release time, end time, restriction point, restriction altitude, restricted airports, flow control messages, total duration, and the number of flights.

b) A-SMGCS provides two types of data, flight plan data and runway status data, to the ATFM system.

- Flight plan data includes ACID、ADEP、ADES、EOBT、ETA、ATOT、GATE、Ground status, runway, SID, and etc.
- Runway status data includes airport name, runway name, runway arrival /departure status, temporary status, start time, operation level, and etc.

Application of Flow data in A-SMGCS

2.3 A-SMGCS receives CTOT, COBT, SOBT, and other data sent by the ATFM system, performs internal processing, and displays the results on the electronic flight strips in different system controller positions.

2.4 Restriction Data Processing

a) A-SMGCS receives flow control restriction data sent by the ATFM system, and displays it in the "restriction window" in the position.

Fig.2 Restriction Information Display Window

b) A-SMGCS processes and displays wait pool markers and restricted flight markers received from the ATFM system. If a flight is determined to enter the wait pool, the status area of the electronic flight strip changes color and it cannot be handed over to the next control sector.

Similarly, restricted flights are marked on the electronic flight strip. Controller can click on the CTOT area, and view the corresponding restricted flow control restriction.

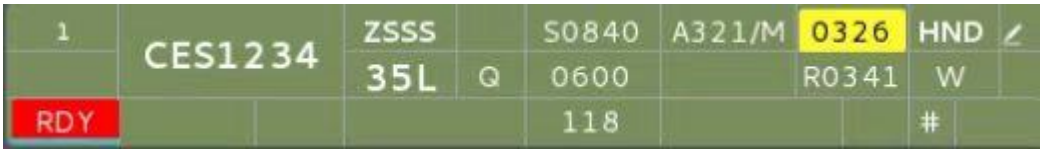

Fig.3 Waiting Pool Display

2.5 CTOT, COBT, and Other Time Data Processing

a) A-SMGCS receives CTOT, COBT, and other time data calculated by the ATFM system. In A-SMGCS these time data is matched with the flight plan identifier, SOBT, EOBT, etc.

b) The corresponding COBT time for each flight is displayed in the electronic flight strip at the clearance position, while the CTOT time is displayed in the electronic flight strip at the ground and tower positions.

c) This minimizes the need for controllers to repeatedly cross-check the aforementioned data between the two systems and reduces their workload.

Fig.4 CTOT Display

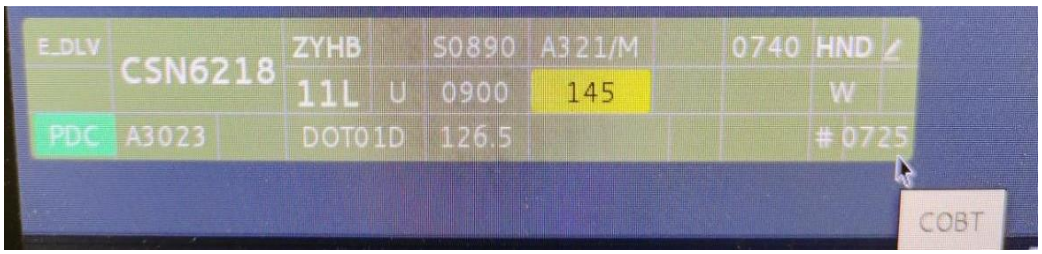

Fig.5 COBT Display

<u>Application of A-SMGCS data in Flow Management system</u>

2.6 Update CTOT and COBT

a) Before the lock of flight TSAT time, if the runway in the plan is different from the one assigned, or if the gate is changed, the ATFM system will update the relevant data and recalculate the CTOT and send it back to A-SMGCS.

b) The VVT experienced-time values for all gates have been set offline in the ATFM system. If there is a change in CTOT, the system will use CTOT-VVT to calculate the new COBT and send it back to A-SMGCS.

2.7 Update ground status

a) When the ATFM system receives time stamps (READY TIME, PUSH TIME, TAIX TIME, OVER TIME, TOUCH TIME, and ATOT) sent by A-SMGCS, it directly updates the corresponding time. These time stamps are used to determine the actual flight status in the ATFM

system and are displayed on the system terminal.

Advantages

2.8 The implementation of data exchange allows air traffic controllers to check flow control data such as COBT and CTOT within A-SMGCS. It eliminates the need for repetitive manual tasks across various systems, thus reducing the workload for controllers.

2.9 A-SMGCS receives and processes data related to flow restrictions, displaying it conspicuously on the electronic flight strips. This serves as a reminder to controllers to monitor the status of restricted flights, effectively minimizing human errors.

2.10 The continuous receipt of data from A-SMGCS enhances the accuracy and real-time calculation of the ATFM system in COBT, CTOT, and ground status.

Next step

2.11 The purpose of this paper is to share the experience of implementation of data interaction between A-SMGCS and ATFM system at Beijing Daxing International Airport, and provide references for other airports.

2.12 It aims to improve air traffic control efficiency by optimizing the data exchange between A-SMGCS and flow management systems. This approach considers the current system function and controllers' requirements, leading to a more streamlined and efficient ATC system.

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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