International Civil Aviation Organization

Tenth Meeting of the Air Traffic Management Sub-Group (ATM/SG/10) of APANPIRG

Video Teleconference, 17 – 21 October 2022

Agenda Item 5: ATM Systems (Modernization, Seamless ATM, CNS, ATFM)

APPLICATION OF RUNWAY STATUS LIGHT SYSTEM IN CHINA

(Presented by China)

SUMMARY

This paper presents updates on runway incursion mitigation work done by civil aviation of China and implementation of runway status lights system in China.

1. INTRODUCTION

1.1 CAAC takes runway incursion as one of the four major hazardous sources in civil aviation management. Preventing the occurrence of runway incursions is the focus of China's civil aviation safety. The Air Traffic Management Bureau (ATMB) of CAAC has formulated the "*Technical Measures and Implementation Routes for Preventing Runway Incursion*", which stipulates the minimum configuration requirements for runway incursion prevention equipment at airports of different levels. It is anticipated that all airports will be properly equipped by 2025, showcasing overall improvement of surveillance capabilities, controllers/pilots' situational Awareness and runway incursion warning capabilities.

1.2 The technical means of runway incursion mitigation are usually divided into three categories. First is using a variety of technologies to accurately monitor the airport surface, including surface surveillance radar, MLAT, ADS-B, enhanced surface surveillance system, vehicle-mounted beacon, differential GPS, etc. Second is using the automated system that serves operation of the tower, including tower control automation, A-SMGCS, EFPS, ITWP and other systems. Third is directly informing pilots, vehicle drivers and other staff of alerting information, including stop bar lights, Runway Status Lights (RWSL), etc. The first two categories have relatively mature cases of implementation in China, and the stop bar lights in the last category have also been commissioned at some airports, however, in comparison, the deployment of RWSL has not made commensurate progress. RWSL program is currently going through the application and promotion phase of demonstration.

1.3 Since many runway incursion events happened in recent years, CAAC realized that it is necessary to deploy an automated system with the capability to alert pilots directly, therefore initiated researches and demonstration of RWSL. ATMB took the lead in organizing authorities and stakeholders to carry out the installation and demonstration of the runway incursion preventing system based on RWSL system at Shanghai Hongqiao Airport.

2. DISCUSSION

RWSL Demonstration at Shanghai Hongqiao Airport

2.1 RWSL is an automated alerting system that uses lights to warn pilots and vehicle drivers. The system directly provides pilots and vehicle drivers clear and timely indication of runway occupancy status, and is not affected by human factors such as ATC instruction errors and communication errors. The two basic visual components of runway status lights are the runway entrance lights and the takeoff hold lights. The runway entrance lights alert pilots and vehicle drivers that it is unsafe to enter or cross the runway, and the takeoff hold lights indicate the runway ahead of the awaiting pilot will soon be or is currently being occupied and it is not safe to take off from it.

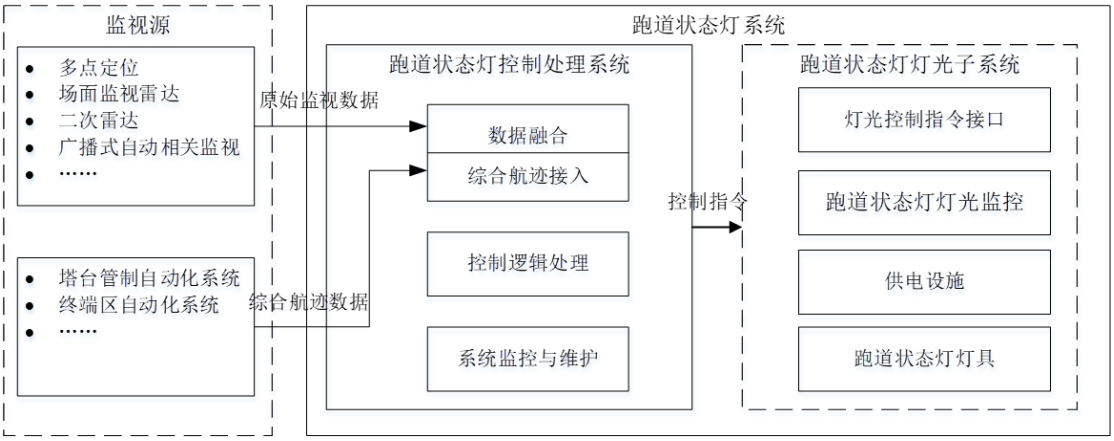

Figure 1 RWSL system block diagram

2.2 As the first demonstration of RWSL in China, installed RWSL includes 1 set of runway entrance lights and one set of take-off hold lights,and even the sources of surveillance data connected to the system include surface surveillance radar, MLAT, ADS-B, and video surveillance. Supported by optical fiber communication, real-time and accurate monitoring of lights can be achieved, attenuating response time of light control command to less than 1 second. The vehicle-mounted terminal transmits data on AeroMACS and LTE network.

2.3 Starting from April 2019, the Second Research Institute of CAAC carried out long-term vehicle operation tests and shadow mode tests, coordinated ATMB, airports, airlines, research institutes and other stakeholders to successfully complete the flight tests, and validated system performance in all runway-involved scenarios.

Figure 2 Testing Take-off Hold Lights at Shanghai Hongqiao Airport

Implementation of RWSL in China

2.4 Civil Aviation of China is committed to establishing a complete system of standardization to facilitate development, validation, and implementation of various new technologies. As a critical part of the runway incursion avoidance solution, standards of RWSL are in the stage of perfection. Some promulgated standards of civil aviation, including *Technical Standards for Maneuvering Area of Civil Airports and Technical Requirements of Runway Status Lights Control System*, have stipulated the installation and design of RWSL, functions and performance requirements of the control processing system, which provides reference for construction and use of RWSL.

2.5 Civil Aviation of China is currently actively promoting RWSL system. The first set of production RWSL system has been incorporated at Xinjiang Hotan Airport, which includes 8 sets of runway entrance lights providing runway occupancy indication for aircraft and vehicles preparing to enter the runway. Besides, many hubs such as Shanghai Hongqiao, Chengdu Tianfu, Chongqing Jiangbei, and Lhasa Gonggar are also planning production deployment of RWSL, expecting completion in recent years.

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 matters as appropriate.

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