



DIRECTORS GENERAL OF CIVIL AVIATION CONFERENCE ON A GLOBAL STRATEGY FOR AVIATION SAFETY

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IMPLEMENTATION OF SAFETY MANAGEMENT SYSTEM AND RUNWAY SAFETY MEASURES IN SINGAPORE

(Presented by Singapore)

SUMMARY

This paper provides a brief overview of the safety management system (SMS), and some of the runway safety initiatives undertaken at Singapore, Changi Airport by the Civil Aviation Authority of Singapore to enhance safety of aircraft operations and to prevent runway incursions.

1. INTRODUCTION

1.1 Runway safety continues to be one of the key areas of focus in international civil aviation. Like other States and international organizations, the Civil Aviation Authority (CAA) of Singapore (CAAS) which operates Changi Airport has undertaken various initiatives to enhance the safety of aircraft operations.

2. SAFETY MANAGEMENT SYSTEM

2.1 The CAA of Singapore has put in place a comprehensive safety management system (SMS) to systematically identify, assess and mitigate safety risks to aviation safety. First initiated in December 2001, the CAA's SMS has evolved from a mere policy documentation exercise to an action-oriented and robust process. Recognizing that top management's early and continuing involvement is essential to drive the safety management process in any organization, the CAA set up a high-level Safety Management Steering Committee (SMSC) from the onset to provide leadership and guide working-level safety groups in their safety work plans, both within divisional and cross-divisional processes.

2.2 The challenge for the CAA of Singapore in SMS is to develop and sustain a safety culture within the organization. In line with ICAO and international best practices, the CAA's SMS currently embraces *inter alia* the following key safety principles:

- a) safety assessment — to systematically analyze proposed changes in systems and procedures to identify and mitigate any weaknesses before implementing change;
- b) safety investigation — to promptly investigate any incident which has safety implications so that necessary action can be taken to prevent future lapses;
- c) safety promotion — to actively disseminate safety lessons arising from safety occurrence investigations both internally and outside the organization if appropriate; and
- d) safety oversight — to systematically monitor and assess safety performance.

2.3 The adoption and implementation of SMS by CAAS has helped ensure a higher level of safety of aircraft operations at our airports. As an example, at Changi Airport, airside works may often need to be carried out in an operational airport environment, necessitating the closures of active runways and taxiways. Managing these activities safely is not limited to action on the ground, but requires a comprehensive and systematic process of planning, consultation and information dissemination. As such, before any major airside works can be carried out, an in-depth safety assessment has to be carried out by the aerodrome engineering staff, in consultation with the airport users, apron and air traffic control (ATC). Such procedures now form part of the SMS, to systematically identify potential risks and hazards, and to implement necessary safeguards for airside works to be carried out safely.

2.4 SMS is a closed loop process which requires feedback to assess the effectiveness and performance of the system. To this end, CAAS has established safety standards to serve as benchmarks for periodic evaluation of staff competency and safety performance. These safety indicators are reviewed regularly at the various safety committee and group meetings. In addition, CAAS has put in place procedures for reporting safety occurrences and other unsafe conditions. Under existing law, it is mandatory to report aircraft accidents and serious incidents to the appropriate authorities. However, seemingly minor incidents that have potential to enhance safety may go unreported. Thus, various reporting systems and channels have been established to allow airport users to report hazards (i.e. unsafe conditions which have not yet caused an incident), incidents and accidents to CAAS. Knowledge derived through such reporting systems help create a better understanding of the causes of hazards, incidents and accidents, and in defining and refining CAAS' intervention strategies to enhance aviation safety. To illustrate, CAAS collates birdstrike reports submitted by ATC, pilots and other airport users and monitors the trend in birdstrikes over a certain period of time. Safety indicators and corresponding trigger levels (i.e. levels that would initiate corrective action once breached) are then set, taking into account historical data. These safety indicators serve as a measure of the effectiveness of control measures taken by CAAS to minimize birdstrikes, and are reviewed regularly and improved upon, if necessary.

3. RUNWAY INCURSION PREVENTION MEASURES

3.1 Runway incursions are one of the most significant hazards in aviation today. Runway incursions are caused by a variety of factors such as bad weather or poor visibility conditions, confusing or unclear airfield markings, lightings and signages, and breakdown in communications between controllers and pilots. Although not a serious problem at our airports, CAAS has put in place enhanced

operational procedures and introduced new technologies to prevent runway incursions. For example, Changi Airport's surface movement radar will be enhanced with multi-lateration surveillance technology with safety features to alert ATC of potential runway incursions more accurately by end-2006. CAAS is also exploring the installation of microwave barrier detectors across the runway holding positions to detect unauthorized entry of aircraft or vehicles into the runway. In addition, physical barriers such as marker boards fitted with retro-reflective strips or red lamps are used to demarcate closed taxiways/runways to prevent pilots and vehicle drivers from straying into closed areas in the airfield.

3.2 Regular and constructive feedback from airport users, especially from pilots, is an effective tool in enhancing runway safety at Changi Airport. Towards this end, an Airport Surface Safety Group (ASSG) comprising various stakeholders such as pilots, airlines, ATC and aerodrome engineering staff come together regularly to identify and address potential runway safety problems at Changi Airport. For example, arising from pilots' feedback, CAAS had replaced all front-lit, reflective information and mandatory taxiway signs at our airports with internally-lit ones that provided better readability and luminance. Advice and user input were also sought from pilots to ensure that the inscription and location of these signs provided pilots with clear indications of where they were, especially during periods of limited visibility. Furthermore, taxiway markings on parallel taxiways have been enhanced to reduce the risks of pilots mistakenly taking-off on these parallel taxiways.

3.3 The management of wildlife hazards is also an essential part towards ensuring safety of operations at an airport. In this respect, CAAS continues to explore ways to minimize the safety risks posed by wildlife to aircraft operations. In particular, for bird hazards, CAAS proactively manages the environment such that the airport is unattractive to birds. CAAS also works closely with an ornithologist from the local university to put in place control measures to reduce bird hazards and birdstrikes with aircraft. Preventive and corrective measures to control animal hazards, especially stray dogs, are also in place. These include frequent surveillance checks to ensure that worksites within the airfield are free of litter, and checks for possible access points to the airfield through perimeter fences, gates, drains, etc.

3.4 Continuing safety education is another strategy by CAAS in the prevention of runway incursions. Runway safety enhancement is a continuous process that requires the efforts and cooperation of all stakeholders of the civil aviation community. In this respect, CAAS has invested in safety training and developing a safety culture within the community, and regularly organizes safety campaigns, seminars and workshops aimed at various target groups such as airside workers, aircrew and other industry partners. These events serve as platforms for participants to share valuable information and exchange views on safety issues.

4. CONCLUSION

4.1 The conference is invited to note the implementation of a safety management system and the various runway safety initiatives by CAAS towards enhancing aviation safety.

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