International Civil Aviation Organization
Asia and Pacific Office

Fourteenth Meeting of the Regional Aviation Safety Group – Asia and Pacific Regions (RASG-APAC/14)

(Bangkok, Thailand, 28-29 November 2024)

Agenda Item 4: ICAO/ Member State / Industry Presentations

PROMOTING INNOVATIVE USE OF TECHNOLOGY FOR ENHANCING SAFE AIR TRANSPORT OF DANGEROUS GOODS

(Presented by Hong Kong, China)

SUMMARY

The COVID-19 pandemic has significantly disrupted the aviation sector, but it has also sparked innovation and led to the adoption of new technologies. As individuals grow accustomed to the benefits of online processes and artificial intelligence, convenience in online shopping has also varied consumer habits and business trends. This shift has made everyday household and industrial items that may contain dangerous goods more accessible which are now commonly embedded in global logistics. To adapt effectively while maintaining high safety standards, stakeholders must seek smarter and more efficient ways to operate. The Civil Aviation Department of Hong Kong, China actively encourages industry partners to embrace innovation and integrate technology for enhancing aviation safety and efficiency. This paper shares one such application developed by an industry partner in Hong Kong, China, that implements an intelligent cargo thermal detection system in a cargo terminal at the Hong Kong International Airport (HKIA), thereby improving the overall safety and operational efficiency.

1. INTRODUCTION

1.1 While the COVID-19 pandemic has severely affected the aviation industry, it has also driven innovation and adoption of new technologies in everyday life. As consumers grow more accustomed to online processes and artificial intelligence, the increase in demands for online shopping means more everyday household and industrial items, which may contain dangerous goods, are likely to be transported. More and more ordinary household or industrial items containing dangerous goods have become air cargo packages transported in a consolidated manner and embedded in global logistics.

1.2 To adapt to the changing air transport needs and aviation landscapes in the post-pandemic era while maintaining high safety standards, aviation stakeholders must seek smarter and more efficient ways to operate. The Civil Aviation Department of Hong Kong, China (HKCAD), while fulfilling its regulatory role, is committed to encouraging and facilitating local aviation stakeholders in embracing innovation and integrating technology to enhance safety and efficiency in the aviation system.

2. DISCUSSION

2.1 Changes in consumer habits and business trends have led to a notable increase in the volume of dangerous goods being transported, in particular, modern devices powered by lithium batteries. It is well known among aviation experts that bare lithium batteries and items containing lithium batteries pose fire risks in air cargo. In this connection, fire incidents are stark reminders that the integrity and confidence we have built in the global aviation system could in fact be fragile if safety standards are not observed and safety measures are not implemented properly. In view of these challenges, one of the innovators in Hong Kong, China has embraced the opportunity to leverage its research and development expertise to address these pressing issues in collaboration with the aviation industry.

2.2 After extensive iterations of research and development, and incorporating valuable inputs and support from local aviation stakeholders, universities, the HKCAD as well as various government agencies, a new intelligent cargo thermal detection system has been successfully developed and put into trial use in a cargo terminal at the HKIA. The system utilizes a combination of technologies including advanced thermal imaging technology, thermal dynamics, fluid mechanics, and artificial intelligence, resulting in a solution that can be integrated into the cargo terminal's operations.

2.3 In the aim to identify cargo with potential fire hazard which may stem from spontaneous combustion of the items being shipped and warn the cargo handling personnel, the system is designed to detect and monitor the temperature of cargo packaging using thermal imaging cameras, with corrections applied taking into consideration of various heat transfer properties of different types of packaging materials, which is calculated from data collected from extensive testing at the research and development stage. This means despite the items being shipped are wrapped in different materials such as wooden crates and aluminium containers, the system will still be able to detect if the cargo has an abnormal temperature and alert the operator. To further reinforce its accuracy, the system also considers real-time environmental factors such as ambient temperature, weather conditions and lighting conditions, ensuring its detection capabilities are not affected under diverse circumstances. By enabling the cargo terminal operator to quickly and accurately identify abnormal heat signatures on the cargo, the system provides early detection of potential fire hazards. This proactive approach aims to minimise the risk of serious fire incidents which could lead to costly damages especially if they occur on board an aircraft. Furthermore, the system is designed for seamless integration into cargo inspection processes, with the aim to ensuring minimal disruption to the operations, while enhancing level of safety at the cargo terminal. As improvements are iterated through the system's trial programme, it is anticipated that the scalability will allow it to be implemented at more points in the cargo terminals, bringing flexibility to tailor to the needs of different organizations. Ultimately, this innovative technology aims to contribute to the overall safety and efficiency of the aviation system, reinforcing the industry's commitment to maintaining high safety standards in an evolving landscape.

2.4 The HKCAD remains committed to positioning itself at the forefront of supporting the local aviation community by facilitating the integration of innovation and technology into their operations. This commitment is vital for ensuring both safety and efficiency within the aviation system, particularly in a rapidly changing environment where new challenges and opportunities continuously emerge. The HKCAD's proactive approach not only addresses current operational requirements, but also aims to future-proof the aviation section against evolving demands and technologies so that a resilient aviation system that can adapt to unforeseen circumstances.

3. ACTION BY THE MEETING

3.1 The Meeting is invited to:

a) Note the information contained in this Paper;

b) Recognize the importance and benefits of embracing innovation and technology to alleviate challenges as global aviation systems recover and thrive; and

c) Share experience, challenges and considerations in applying innovations and technologies to enhance aviation safety and efficiency.

— END —