Ninth Meeting of the Surveillance Implementation Coordination Group (SURICG/9)

IP/19
Enhancing Surveillance Provisions for Safe and Reliable Services from Aerodrome Control Towers and Apron Control Centres in the Hong Kong International Airport

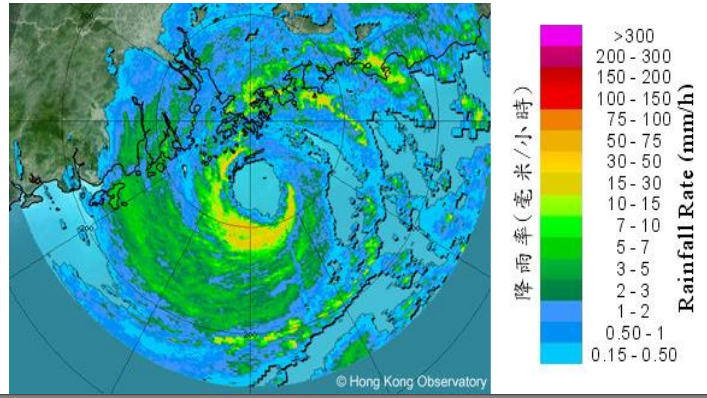
Presented by Hong Kong, China

Introduction

Adverse weather in Hong Kong

- foggy weather
- rainstorm

- thunderstorm
- tropical cyclone



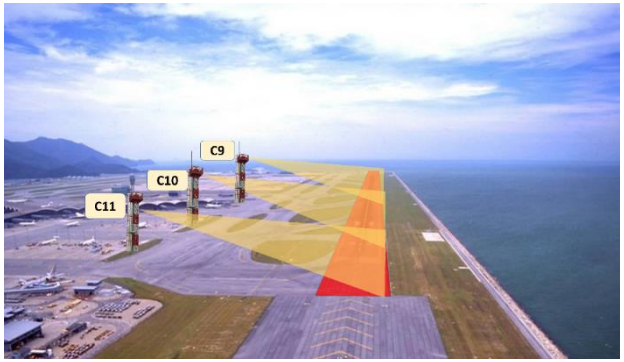
Introduction

- Enhanced surveillance provisions at the HKIA: for providing safe and reliable services from aerodrome control towers and apron control centres, with the below applications:

1. Advanced Surface Movement Guidance and Control System (A-SMGCS)

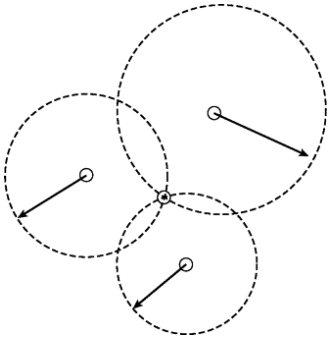
2. Digital Apron and Tower Management System (DATMS)

3. Automatic Foreign Object Debris Detection System (AFODDS)



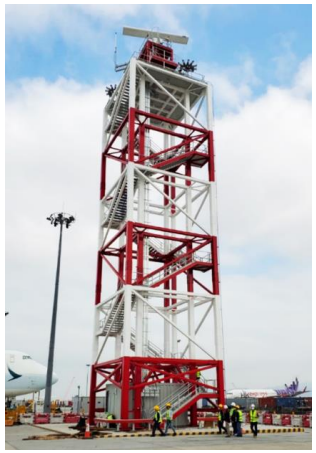
1. Advanced Surface Movement Guidance & Control System (A-SMGCS)

Integration with data available from:



MLAT

ADS-B



Surface Movement Radars (SMR)

Airfield Ground Lighting (AGL)

Benefits

- ✓ Provision of both visual and audio alarms for meeting pre-defined criteria for pre-alert and alert conditions upon detecting potential conflicts and runway incursion situations for enhanced flight safety and efficiency.

- ✓ The accurate surface movement information provided by A-SMGCS enables the ATCOs to maintain situational awareness at all times under various visibility conditions.

A-SMGCS

Human-machine Interface of A-SMGCS at the HKIA

2. Digital Apron and Tower Management System (DATMS)

- The DATMS comprises two systems:
  - Digital Tower Facilities (DTF)
  - Digital Apron Management System (DAMS)

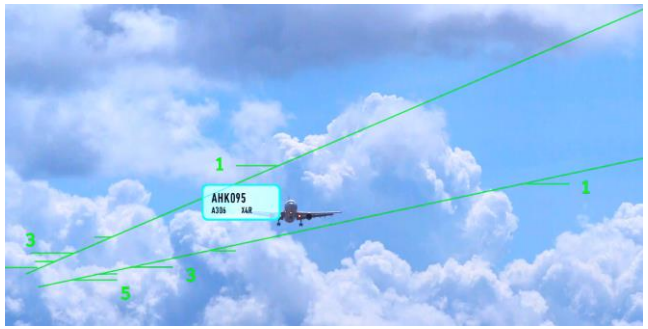
- **A total of 240 cameras** installed at various strategic locations at the HKIA
- Both DTF and DAMS leverage on cameras installed at strategic locations and “stitching” of camera outputs to generate panoramic views
- DTF provides enhanced visuals of air and ground movements and supplements out-of-eyesight views for **ATC** while DAMS generally caters for **airport operation**
- DTF and DAMS mutually share **video outputs**, **flight information** and **surveillance** data to enable users of either system to have the necessary and integrated real-time visualization of activities at the airport

Digital Tower and Apron at HKIA

Ultra-high resolution cameras on airfield

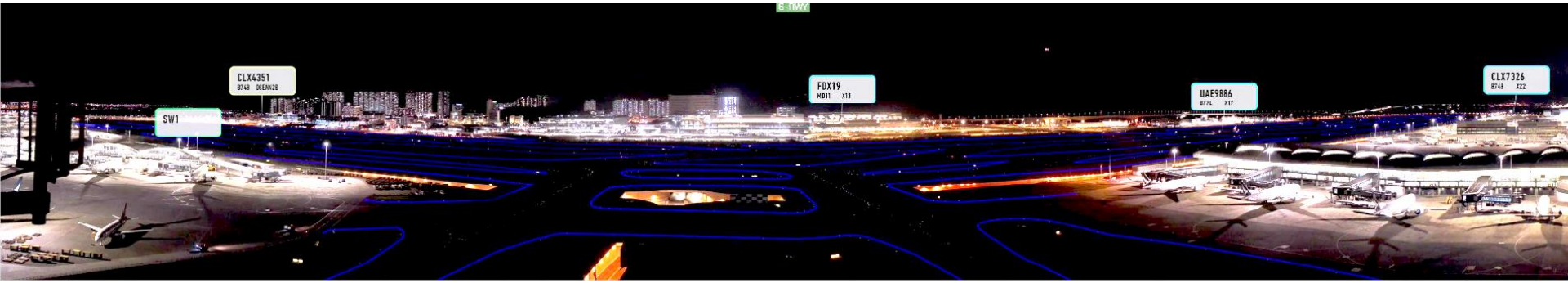
DTF display at ATC tower

Investigation Positions



Augmented flight information on an approach flight

Detection and labelling of an aircraft on taxiway

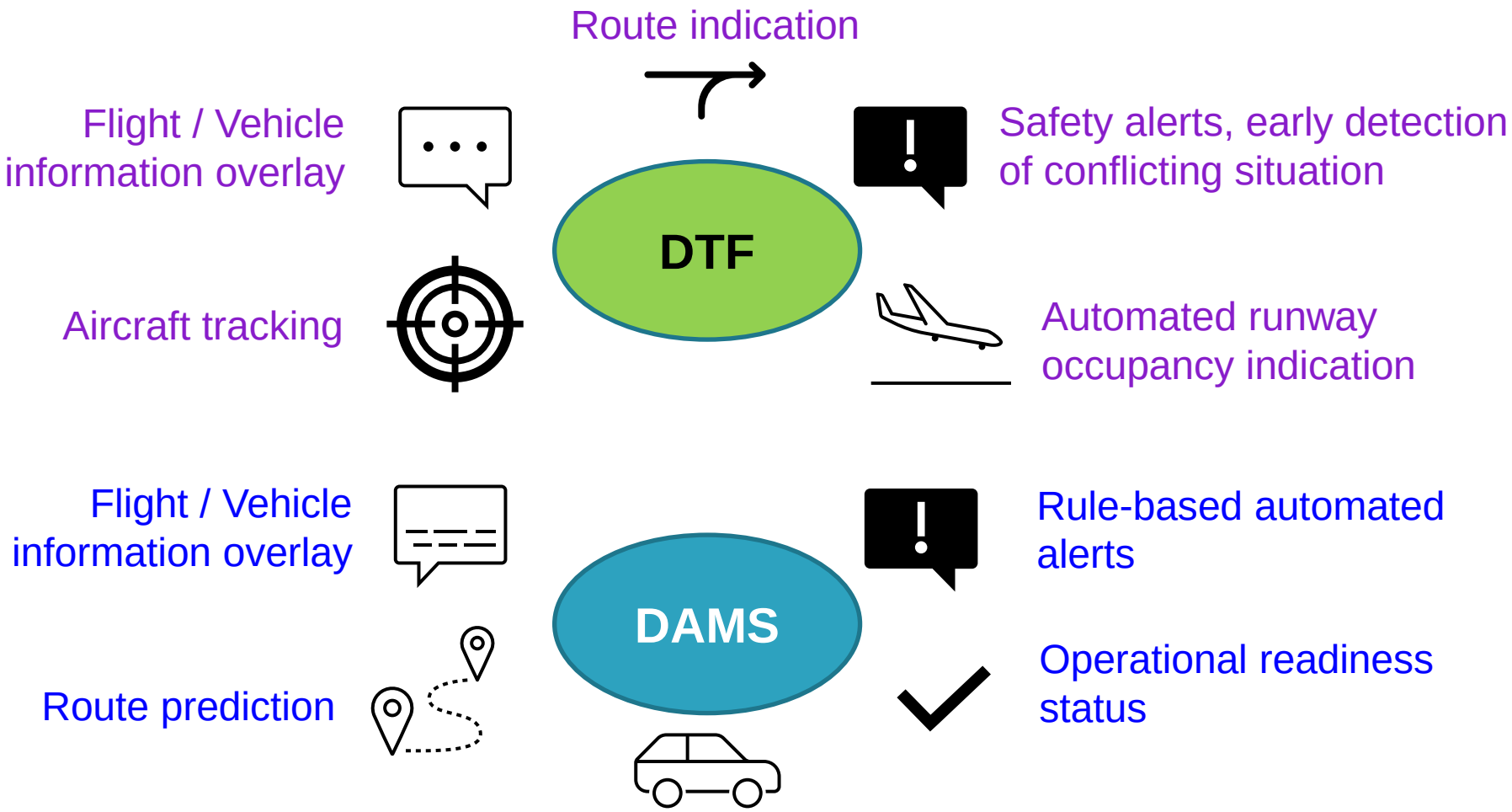


Enhanced visibility during night-time and low visibility

Benefits

- ✓ Improved operators' experience
- ✓ Appreciation of activities on the airfield with views of interest on one screen compared to single focused view
- ✓ Enhanced efficiency and safety of ATC and airport operations
- ✓ Increased visibility under low light or low visibility conditions such as during adverse weather
- ✓ Out-of-eyesight views from strategically located cameras
- ✓ Predictive alerts of conflicting situation or intrusion into runway and airfield restricted areas

DTF and DAMS Features



Panoramic runway views at HKIA

DTF showing an aircraft taxing on Third Runway of the HKIA

DTF showing aircrafts taxing / take-off / landing on South Runway of the HKIA

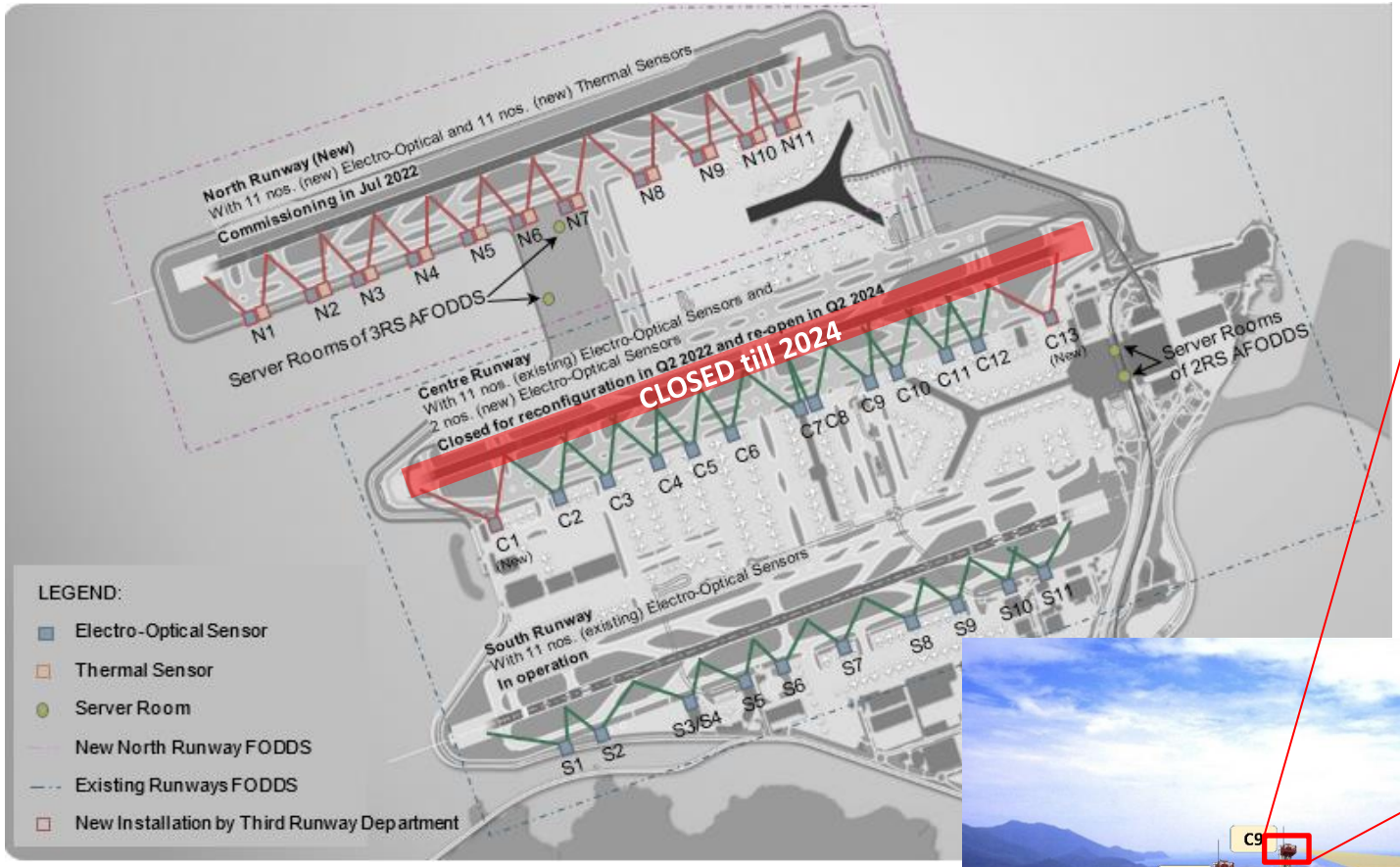
DTF view on Airfield under foggy / low visibility situation

DAMS view and setups

DAMS showing apron view of the HKIA

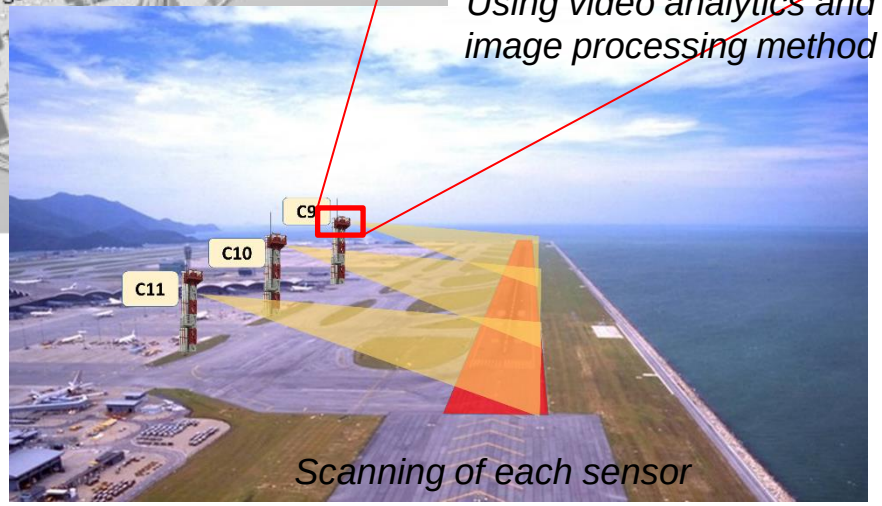
DAMS Operator Position

3. Automated FOD Detection System (AFODDS)



Installation location of AFODDS at the HKIA

Using video analytics and image processing method



Scanning of each sensor

Benefits

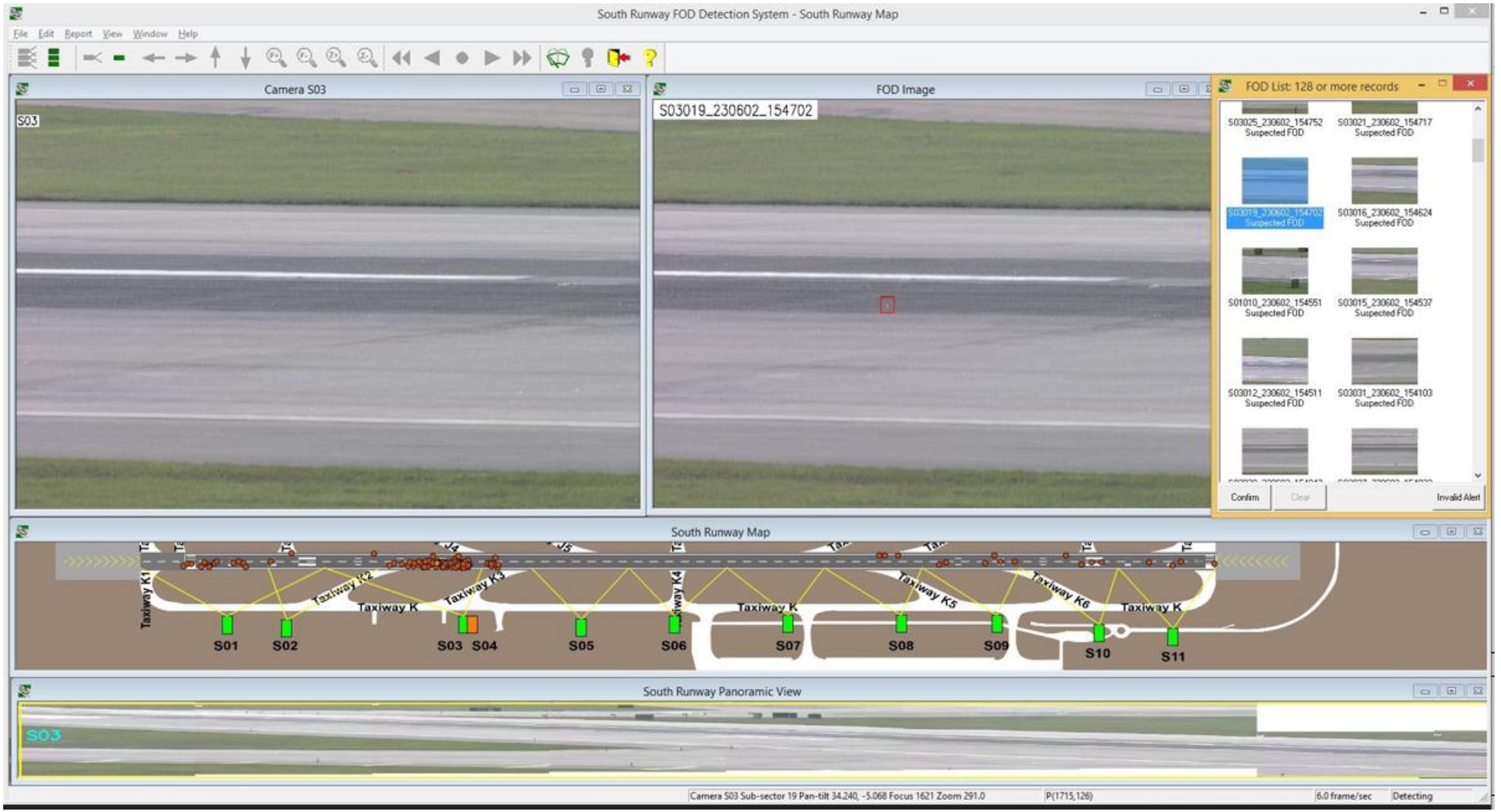
- ✓ To provide round-the-clock monitoring of stray items
- ✓ Capable to detect items as small as a golf ball under all weather conditions
- ✓ If foreign objects are found on the runways, AFODDS will alert the apron control centres and aerodrome control towers

AFODDS

AFODDS Tower at the HKIA

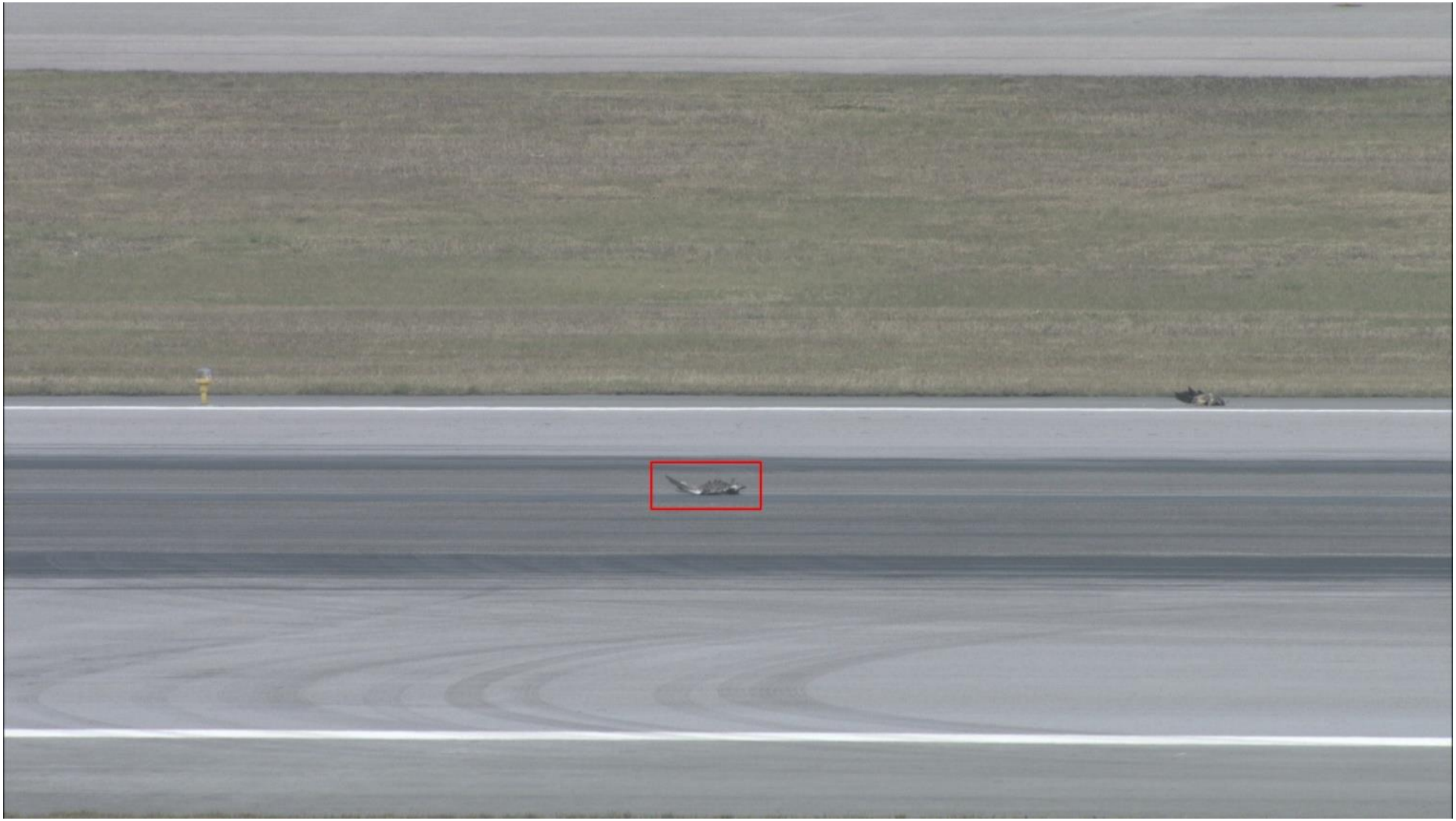
	2RS	3RS
Operation Time	From 2015	From July 2022
First Sensor	**Image Resolution** 1920 x 1080 Pixels **Image Sensor** Visual Spectrum CCD **Lens Zoom** Optical Zoom Factor 35x	**Image Resolution** 3840 x 2160 Pixels **Image Sensor** Visual Spectrum CCD **Lens Zoom** 18x with 2x Extender
Second Sensor	--	Thermal Image
Tower Height	13m (Centre Runway) 11m (South Runway)	15 m (North Runway)
Average Coverage	Approx. 345.5 m per Sensor	

AFODDS



Human-machine Interface of AFODDS at the HKIA

AFODDS



FOD reported (Bird Carcass)

Conclusion

- Implementation of A-SMGCS, DATMS and AFODDS :
  - ✓ enhancing surveillance capabilities and real-time situational awareness
  - ✓ fostering closer collaborations with quick decision-making
  - ✓ improving safety and efficiency of the overall aerodrome tower control and apron operations
  - ✓ The application of advanced digital/smart technologies in the HKIA has provided an example for further enhancing the safety and efficiency of busy airports
- States/Administrations are invited to consider the implementation of relevant technologies, based on the ICAO GANP / ASBU framework

Action by the Meeting

The meeting is invited to:

a) consider the implementation of relevant technologies, based on the ICAO GANP / ASBU framework; and

b) discuss any relevant matter as appropriate.


Q
&
A
QUESTION
ANSWER

Thank you


• Safe • Orderly • Efficient
• Airworthy • Teamwork
Committed to a Safe, Efficient and Sustainable Air Transport System