Twenty Seventh Meeting of the Communications/Navigation and Surveillance Sub-group (CNS SG/27) of APANPIRG

WP/26 - MANAGING CHALLENGES OF IN-SITU REPLACEMENT FOR INSTRUMENT LANDING SYSTEM AT THE WORLD'S BUSIEST CARGO AIRPORT

Presented by Hong Kong, China

Hong Kong International Airport (HKIA)

Opened in July 1998

International aviation hub &
the world's busiest cargo airport

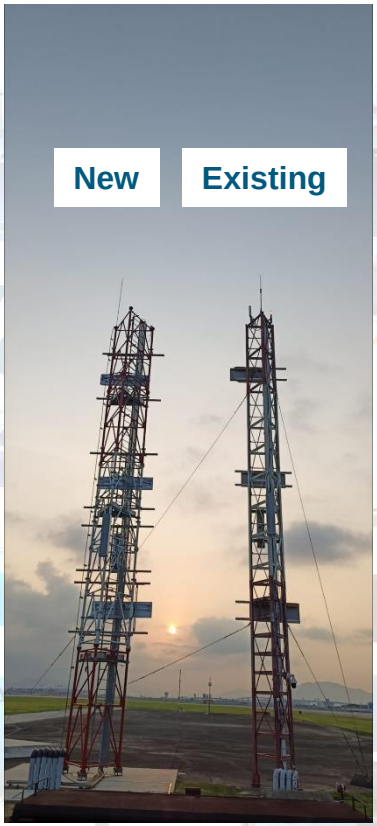
2020: 4.4 million tonnes
2021: 5.0 million tonnes
2022: 4.2 million tonnes

Expansion into Three Runway System

- Existing ILS serving South Runway for **25 years** in good conditions with proactive maintenance
- Opportune to replace ILS to ensure its **sustainability** for 3RS operations
- **Dynamics in wind direction & speed** causing changes in runway landing direction in same day
- **In-situ replacement** is the only feasible option

What is In-situ ILS Replacement?

- Co-existence of existing and new ILS at same site
- Maintain existing ILS operations round-the-clock while new ILS is being installed & tested



- Challenges & risks are identified in project planning stage with risk mitigation measures derived and implemented to manage the risks

Challenges of In-situ ILS Replacement

Major Challenges

- Civil works impose risks in affecting ILS operations
- Construction of new ducts to underground GP buildings induces water seepage
- Limited runway closure period
- Adverse weather

Mitigating Measures

Design Stage → **Implementation Stage** → **Testing Stage**

- Choosing locations of new ILS equipment and corresponding civil provisions was **constrained** due to limited space on an operating runway with existing ILS equipment

- Specialized computer modelling studies & simulations were carried out to ensure:

  ✓ New & existing ILS will not interfere with each other on signal-in-space performances in compliance with ICAO requirements; and

  ✓ New ILS structures will not unduly block visual view from pilot on existing runway approach lights.

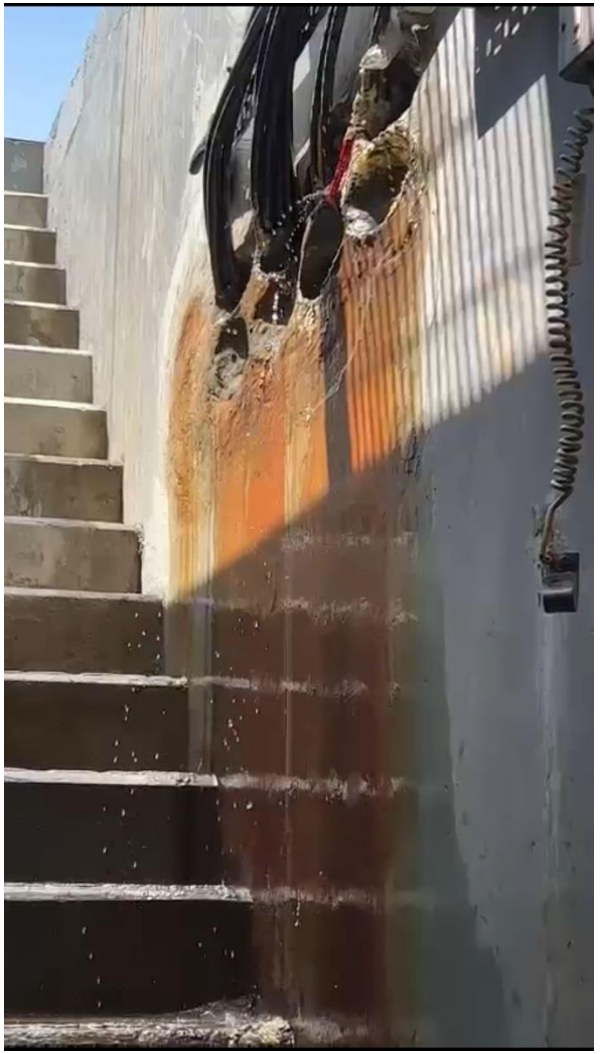
- Flight checks conducted to verify the computer modelling and simulation outcomes

Mitigating Measures

Design Stage | **Implementation Stage** | Testing Stage

Mitigation Measures (1/2)

- Close monitoring on existing ILS performance during civil works and new equipment installation
- Setting monitoring check points on existing equipment structure to ensure no intolerable vibration, settlement and tilting which may affect existing ILS operation
- Monitoring potential water seepage issues during adverse weather
- Project scheduling and human resource planning



Mitigating Measures

Design Stage | **Implementation Stage** | Testing Stage

Mitigation Measures (2/2)

- Arranging low risk works during runway operating periods
- Flexible work arrangement to non-operating side of equipment building
- Arranging off-site installation mock-up prior to site works to get the contractor staff familiar with the equipment installation procedures

Mitigating Measures

Design Stage → Implementation Stage → **Testing Stage**

At least three rounds of flight checks were arranged:

1. DONE — Flight check on existing ILS and runway approach lights right after erecting the new ILS antenna and associated structures
2. DONE — Flight check on new ILS after full installation of new ILS with existing ILS in place
3. Flight check on new ILS right after dismantling of existing ILS (Planned for Nov 2023)

- √ Compliance with ICAO requirements
- √ Full compatibility between existing and new ILS

Action by the Meeting

The meeting is invited to:

a) note Hong Kong, China's experience in managing risks and challenges of in-situ ILS replacement while keeping existing ILS operations to support HKIA's round-the-clock operations as an international aviation hub and world's busiest cargo airport;

b) encourage CAAs/ANSPs who have undertaken similar in-situ ILS replacement works to share their experience and risk mitigating measures; and

c) discuss any relevant matters as appropriate

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