International Civil Aviation Organization

Twenty Sixth Meeting of the Communications/ Navigation and Surveillance Sub-group (CNS SG/26) of APANPIRG

Video Tele-Conference, 5 – 9 September 2022

Agenda Item 15 Any Other Business

FLIGHT INSPECTION CAPABILITY BUILDING OF CAAC FOR CNS FACILITY

(Presented by China)

SUMMARY

This paper provides a brief introduction to the Flight Inspection Center of CAAC (CFI). During the last over 30 years, CFI has committed to develop the inspection capability and play an active role in international meetings, symposiums, and webinars, including CNS meetings.
Through the communication and cooperation among CNS Facilities, CFI would like to contribute to the conventional or satellite-based technological exchange, ICAO SARPs introduction and digestion, take an active participation in the establishment of ICAO SARPs and relevant program implementation in Asian-Pacific area. Also, CFI has the willing and capability to provide high quality flight inspection and validation services for CNS Facility.

1. INTRODUCTION

1.1 Flight Inspection Center of CAAC (CFI) was established in 1989 under the authorization of CAAC. Now, CFI has expanded the fleet to 20 aircraft and provides inspection and validation service for conventional and satellite-based navigation, communication, surveillance, and Nav-Aids facilities. CFI was the first flight inspection unit in the world that certified with ISO/IEC 17025 and the issued inspection report was multilateral recognized.

1.2 By attending the CNS SG meeting, CFI would like to share and exchange the latest information on flight inspection with CNS members. Also through the platform, CFI would like to contribute to the establishment of SARPs based on the practical experience, and promote the relevant program implementation in Asian-Pacific Area.

2. DISCUSSION

2.1 During the over 30-year development, CFI has owned a professional and stable working team to provide flight inspection and validation service.

2.1.1 CFI serves 248 transport airports in China, and checks over 1700 facilities per year.

2.1.2 By using the advanced turbojet aircraft and FIS equipment, CFI provides commissioning, periodic and special flight inspection and validation for conventional and New Tech facilities. CFI is also experienced in complicated airport inspection, such as Nyingchi Airport, and very high plateau airports, for example, Daocheng Airport (the highest civil aviation airport in the world).

2.1.3 CFI is the first flight inspection unit in the world to be certified ISO/IEC17025 with Calibration and Testing Laboratory Proficiency and the Testing Report is international mutual recognized. The innovation on FIS research and development, UAS testing method has gained technical patents and National awards.

2.2 As the group member of CAAC, CFI has attended NSP, CNS and IGWG meetings, seminars and involved in the revision of ICAO Doc 8071, UAS flight inspection standard and regulation establishment, GBAS testing and validation, etc.

2.3 In 2008, CFI was elected the member of International Committee for Aerospace and Standard Calibration (ICASC) and hosted the 16th IFIS in 2010. This is the first time that IFIS was held in Asia. From then, CFI continued to attend the ICASC and IFIS, and exchanged the latest research findings on conventional facilities and new tech with members.

2.4 CFI has provided flight inspection, flight validation, RFI services and flight inspection training for Asian countries and areas, including Hong Kong, Macau, Qatar, Mongolia, and has the capability to produce customized flight inspection manual and testing report. Besides providing the services, CFI also has communication and exchange with FAA, ASEAN and other international organizations and working groups.

2.5 CFI will continuously commit to innovation on site survey, UAS flight inspection, Air Laboratory building up, low altitude visual charts validation, GPS interference detection, etc.

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 matter as appropriate.

Attachment:

Sharing from Flight Inspection Center of CAAC for CNS Facility (PowerPoint)

– – – – – – – – – – – – –

Flight Inspection Capability Building of CAAC for CNS Facility

01 Brief of CFI

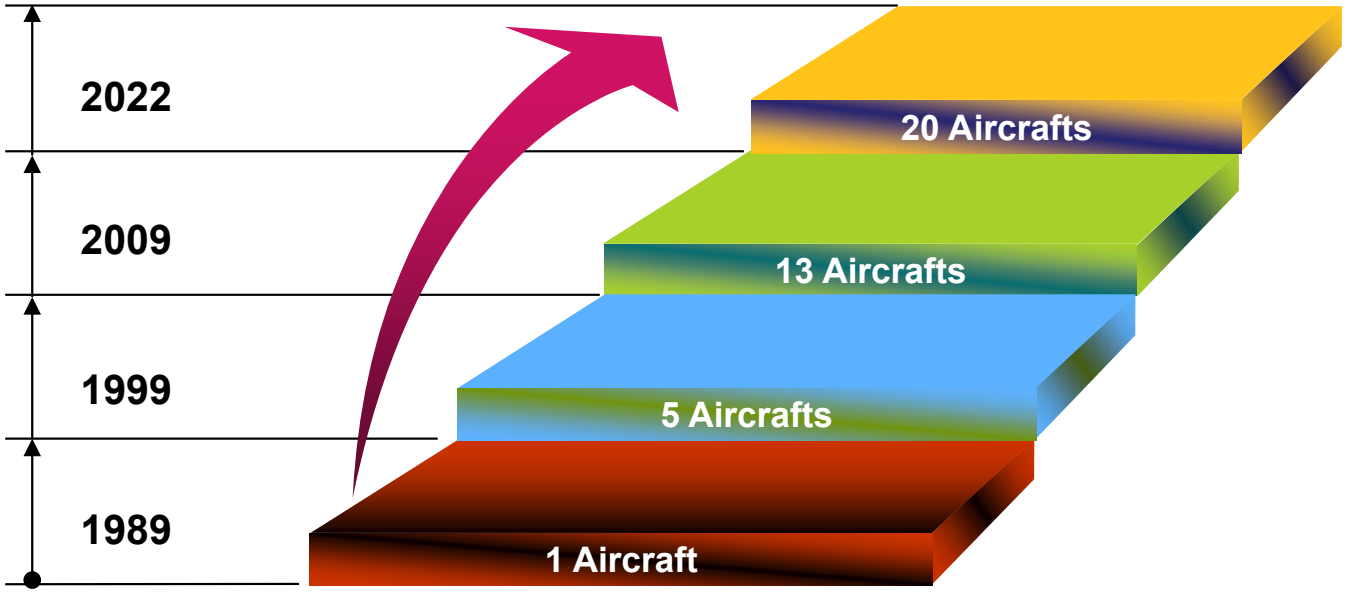
02 FI Capability

03 International Activities

04 Future Plan

Brief of CFI

中国民用航空飞行校验中心
FLIGHT INSPECTION CENTER OF CAAC



Established in 1989.
Now directly under CAAC

Authorized by CAAC to provide inspection and validation services.

01 Brief of CFI

02 FI Capability

03 International Activities

04 Future Plan

Capability - Fleet, Team and Operation

中国民用航空飞行校验中心
FLIGHT INSPECTION CENTER OF CAAC

- CE560XLS/XLS+ (Primary type) x16

- CE680 (Very high elevation airports)x3

- G450(Radar, procedure, lights)

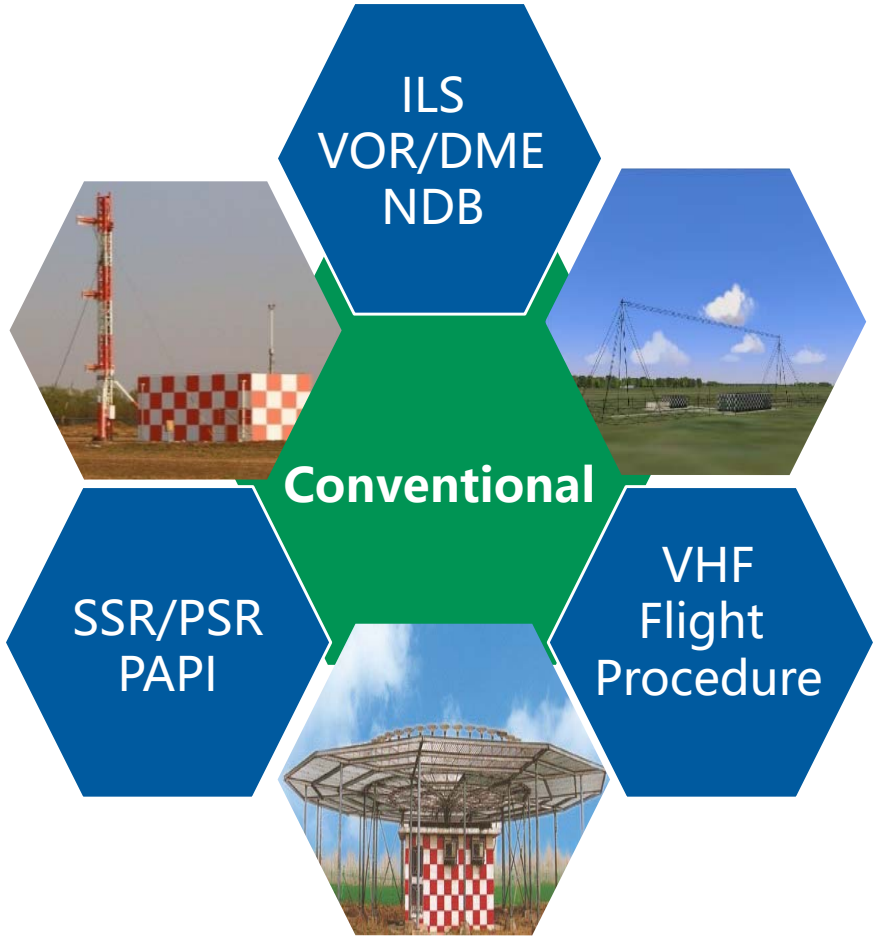
- Domestic FI service
- GBAS/SBAS FI—New tech
- RFI—Guarantee of major domestic activities.
- Nyingchi Airport Commissioning FI (very complicated Airports)
- Daocheng Airport(Highest Civil Aviation Transportation Airport in the world)

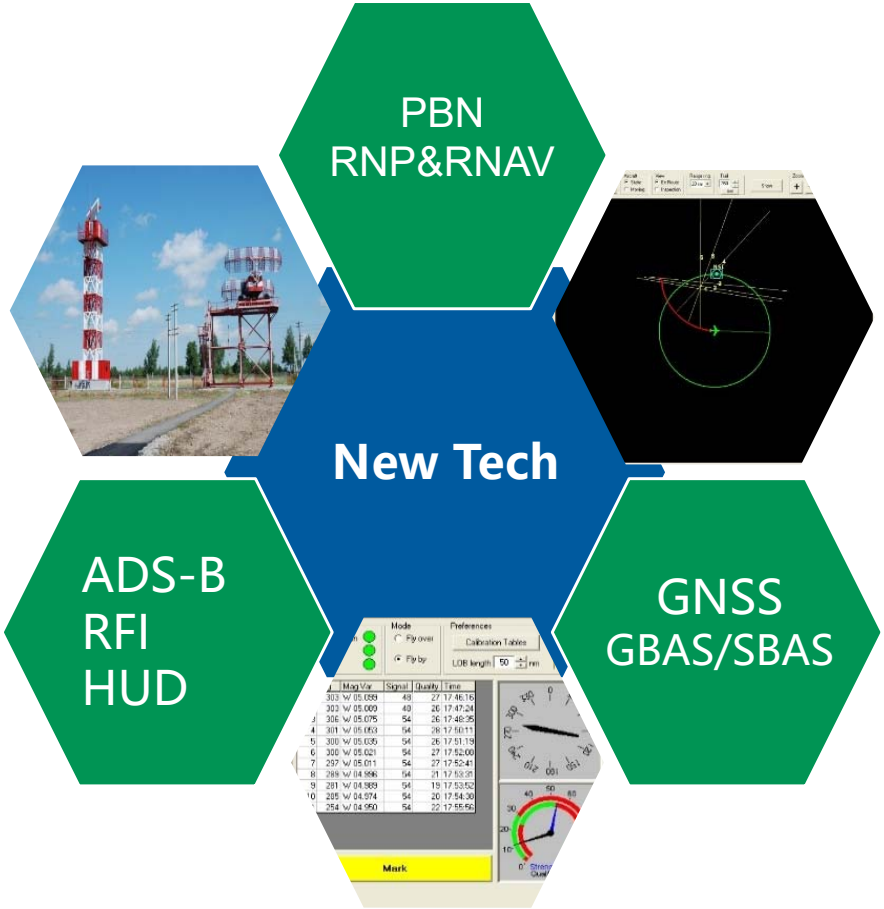
✓Professional, Regulated operation
✓Various Operation Condition
✓Stable team

- **20 aircraft, serve 248 transport airports, annually check 1700 facilities.**

Capability – Facilities and Tech.

中国民用航空飞行校验中心
FLIGHT INSPECTION CENTER OF CAAC



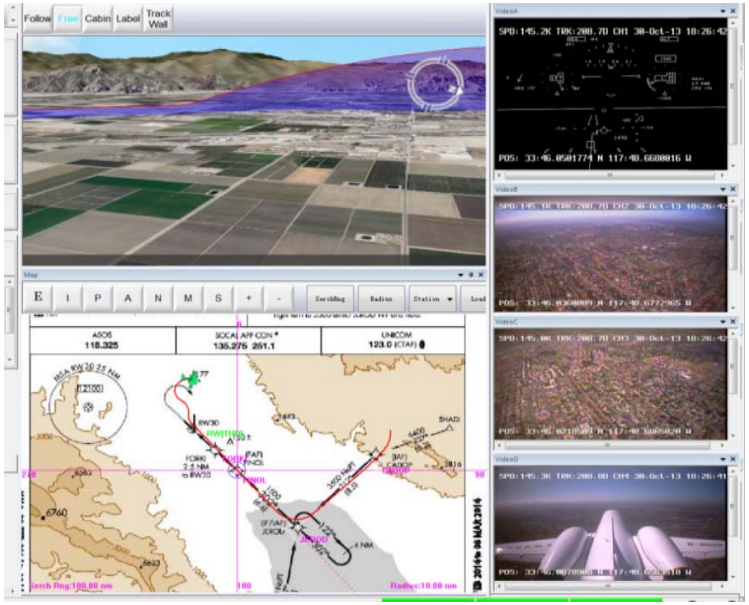


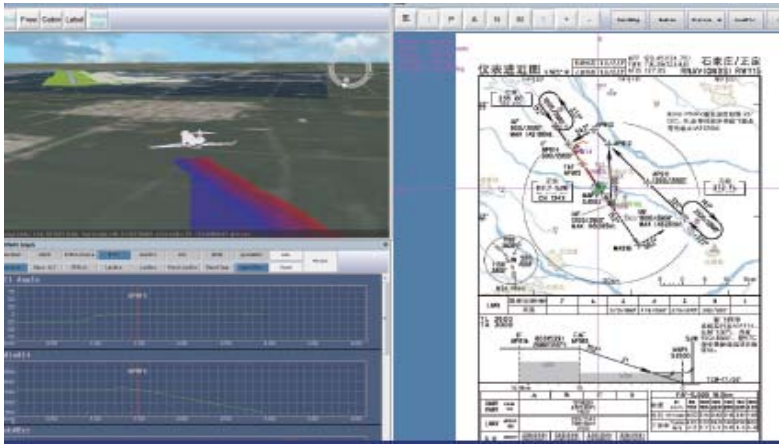
Capability - Facility and Procedure

中国民用航空飞行校验中心
FLIGHT INSPECTION CENTER OF CAAC

➢Conventional

C	VHF	Commissioning (check)
N	ILS, VOR/DME, NDB	Commissioning Periodic, Special (inspection)
S	Radar, Automation System	Commissioning (check)
Visual Aids	Lights System	Commissioning Periodic, Special (inspection)
Procedure	Procedures based on conventional facilities	Commissioning Periodic, Special (Validation)





➢ New Tech

N	GNSS(GBAS/SBAS)	Commissioning Periodic, Special (inspection)
S	ADS-B	Commissioning, Special(Validation)
Procedure	Procedures based on PBN	Commissioning (Validation)

Capability - Quality Control & Innovation

中国民用航空飞行校验中心
FLIGHT INSPECTION CENTER OF CAAC

Quality control

- First flight inspection unit in the world to be certified ISO/IEC17025 with Calibration and Testing Laboratory Proficiency.
- International Mutual Recognized Calibration and Testing Report.

Innovation

- Patents (including US patent)
- Cooperation with Universities and Research Institute

Achievements

- National High Tech Research and development program
- National Key Basic Research Development Plan
- National Science And Technology Support Plan
- National Technological Invention Award 2019

Capability – Regulations and Standards

- ICAO Doc. 8071 and Annex 10
- CCAR-85、CCAR-86
- CAAC Aeronautical Ground-Based Navigation Facility Flight Inspection Regulation
- FAA Doc. 8200 (as required by customer)

Capability - High Plateau Airport

中国民用航空飞行校验中心
FLIGHT INSPECTION CENTER OF CAAC

In June 2021, Nyingchi Airport, lights inspection with RNP AR Operation qualification.

Capability - UAS-based Trial Flight

中国民用航空飞行校验中心
FLIGHT INSPECTION CENTER OF CAAC

From Sep 2017, UAS flight inspection trail flights for navaid lighting in Qinghai, Tibet and Beijing.

From June 2019, UAS flight inspection trail flights for nav facilities in Shandong and Ningxia.

Capability - UAS-based Flight Inspection

中国民用航空飞行校验中心
FLIGHT INSPECTION CENTER OF CAAC

- Established Standard and Regulation Framework of UAS-Based Flight Inspection.
- Two technical specifications were issued by CAAC.

信 息 通 告

中国民用航空局空管行业管理办公室

编　　号：IB-TM-2020-005

下发日期：2020 年 9 月 27 日

基于固定翼/混合翼无人机的
民用航空飞行校验系统技术要求
（试行）

信 息 通 告

中国民用航空局空管行业管理办公室

编　　号：IB-TM-2022-001

下发日期：2022 年 1 月 x 日

基于无人机的民用航空飞行校验
专用地空数据链系统通用技术应用
指导意见(试行)

01 Brief of CFI

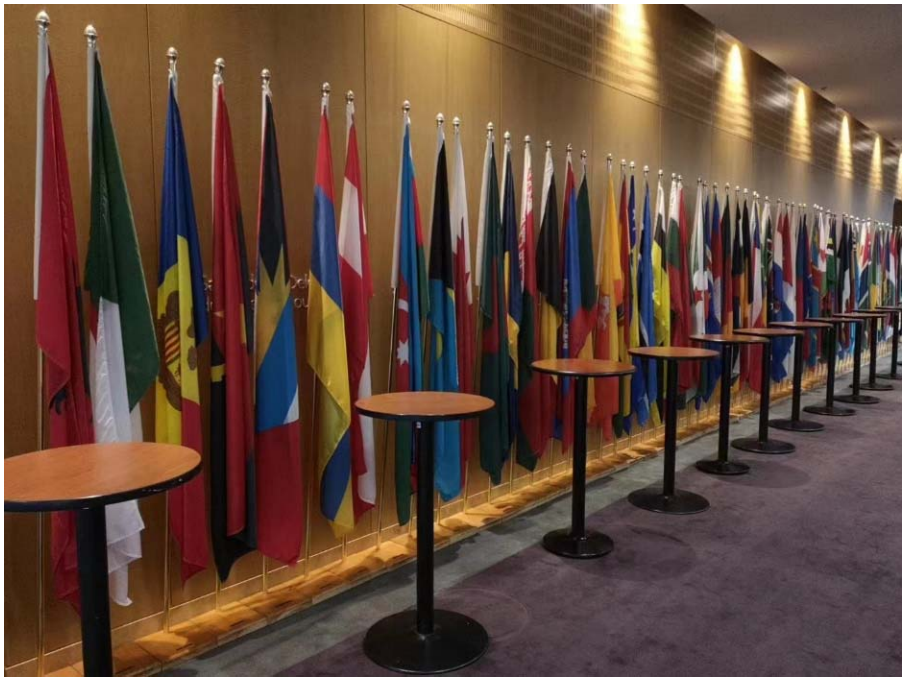
02 FI Capability

03 International Activities

04 Future Plan

International Activities – ICAO NSP

中国民用航空飞行校验中心
FLIGHT INSPECTION CENTER OF CAAC



Papers Submitted to NSP JWG/s		
JWGs/9	wp14	Standard and Regulation Framework Development of UAS-Based FI in China
JWGs/9	wp15	Trial Flight and Standard Establishment of UAS-Based FI for Navaid Lighting in China
JWGs/8	wp25	Standard Establishment of UAS-Based FI System in China
JWGs/4	ip15	Research on Abnormal Tremble of Aircraft Using Autopilot in ILS Approach

International Activities – ICAO APAC

中国民用航空飞行校验中心
FLIGHT INSPECTION CENTER OF CAAC

International Civil Aviation Organization | Organisation de l'aviation civile internationale | Organización de Aviación Civil Internacional | Международная организация гражданской авиации | منظمة الطيران المدني الدولي | 国际民用航空组织

Ref.: T 8/9.6: AP119/21 (CNS) - **REVISED** 14 July 2021

Subject: **REVISED** - Twenty Fifth Meeting of the Communications, Navigation and Surveillance Sub-group (CNS SG/25) of APANPIRG
*(Video Teleconference, **re-scheduled to 18 – 22 October 2021**)*

Action Required: Reply at your earliest convenience, preferably **not later than 4 October 2021**

Dear Sir/Madam,

I am pleased to invite your State/Administration to attend the Twenty Fifth Meeting of the Communications, Navigation and Surveillance Sub-group (CNS SG/25) of APANPIRG which will be **re-scheduled to be held via video teleconference from 18 to 22 October 2021**.

States/Administrations are requested to nominate appropriate expert (s) to join the meeting. The provisional agenda of the Meeting is provided in **Attachment 1**. Information related to the video teleconference, meeting participation, documentation and other arrangement is provided in **Attachment 2**.

INTERNATIONAL CIVIL AVIATION ORGANIZATION
ASIA AND PACIFIC OFFICE

DRAFT REPORT OF

TWENTY FIFTH MEETING OF THE COMMUNICATIONS/NAVIGATION AND SURVEILLANCE SUB-GROUP (CNS SG/25) OF APANPIRG

Video Tele-Conference (VTC)

18 - 22 October 2021

Papers Submitted to CNS SG/25 of APANPIRG	
Wp	UAS-Based PAPI Inspection Technology in China
Ip	Standard Establishment of Data Link for UAS-based Flight Inspection
Flimsy	Standard Establishment of UAS-based Flight Inspection System in China

International Activities – ICAO APAC

中国民用航空飞行校验中心
FLIGHT INSPECTION CENTER OF CAAC

Seminar on Flight Inspection and Procedure Validation 2019

Presentations on:

- Overview of Today's Flight Inspection
- Flight Test of GBAS in China
- Quality Management of Flight Inspection in China
- The Flight Inspection Experience for ILS CAT III
- Flight Validation in China

International Activities – ICASC&IFIS

中国民用航空飞行校验中心
FLIGHT INSPECTION CENTER OF CAAC

Elected member of ICASC in 2008

In 2010, CFI hosted 16th International Flight Inspection Symposium (IFIS)in Beijing.

IFIS held in Asia for the first time.

The research on RFI, Uncertainty evaluation and ISO application has attracted wide attentions and discussion.

International Activities – IFIS

中国民用航空飞行校验中心
FLIGHT INSPECTION CENTER OF CAAC

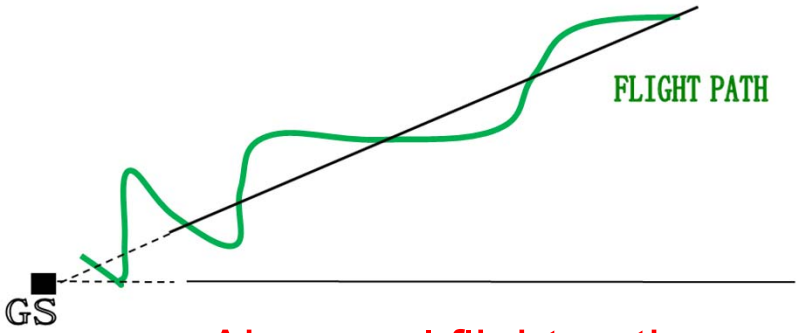
Participated all ICASC & IFIS since 2008

12 papers published on proceedings

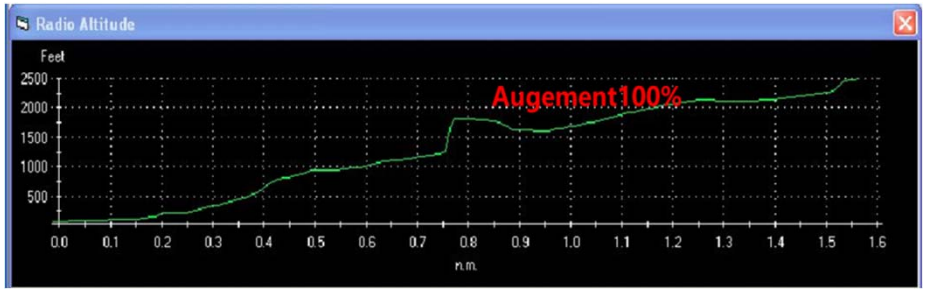
Hot topics on flight inspection:

- UAS flight inspection: Multicopter measurement as a complement. Standard framework
- GBAS application: GBAS GAST-D flight inspection and VDB testing improvement
- DME integrity to support PBN
- GNSS RFI

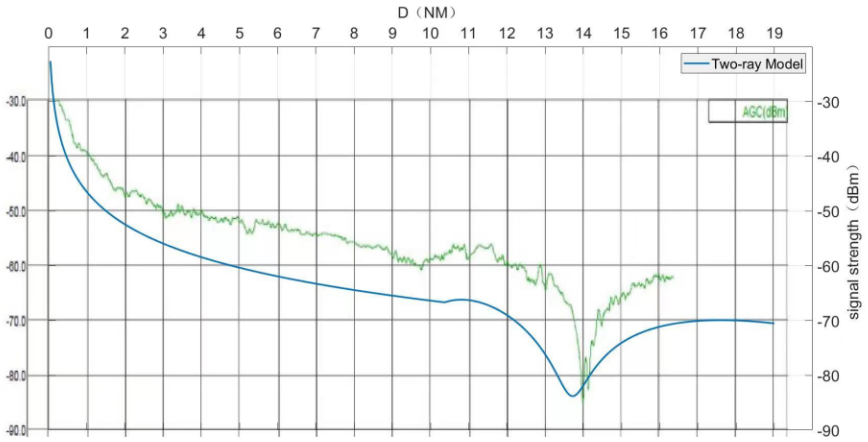
Abnormal Tremble of Aircraft Using Autopilot during ILS Approach in “Deck” airports

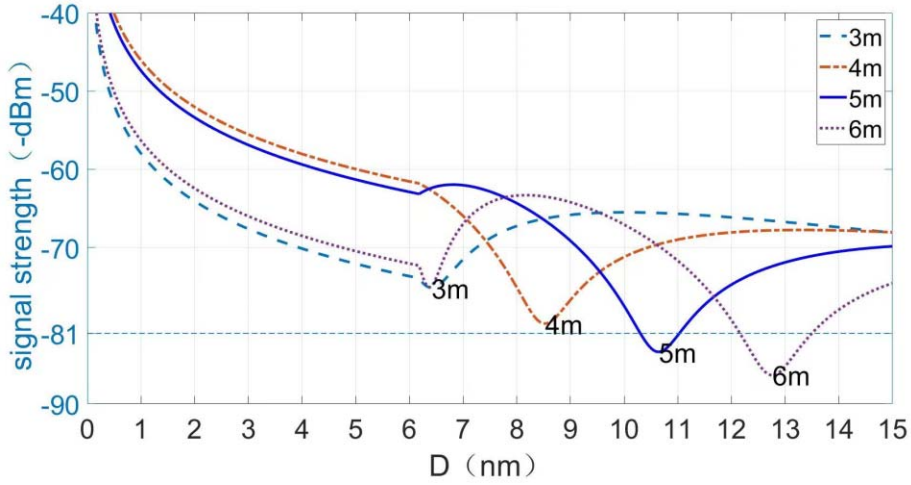


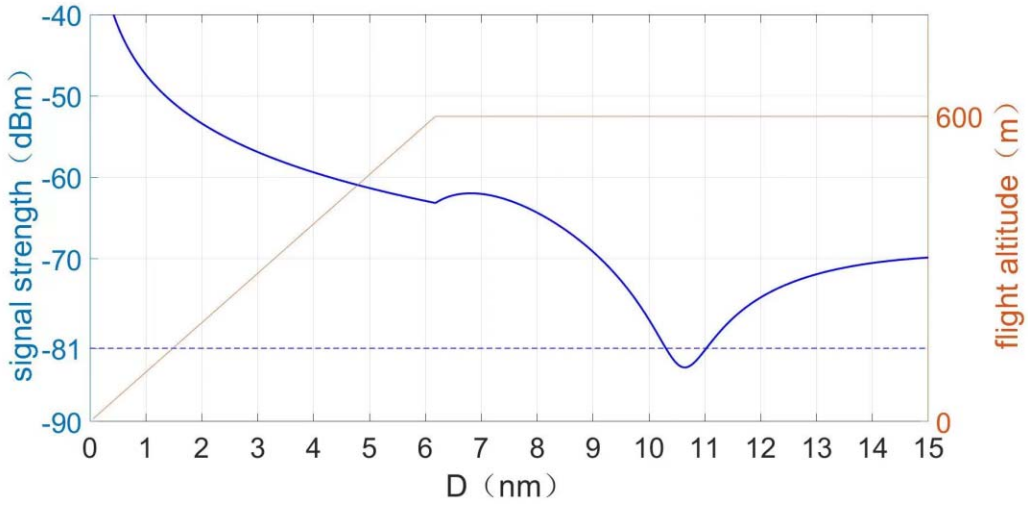
Abnormal flight path



Analysis of DME Signal Strength in Approach Direction under Two-Ray Model

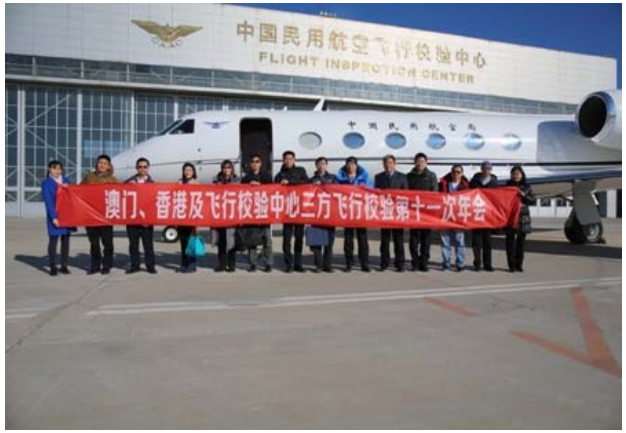






International Activities – INTL FI

中国民用航空飞行校验中心
FLIGHT INSPECTION CENTER OF CAAC



Hong Kong
Macau

Doha

Ulaanbaatar

International Activities – INTL FI

中国民用航空飞行校验中心
FLIGHT INSPECTION CENTER OF CAAC

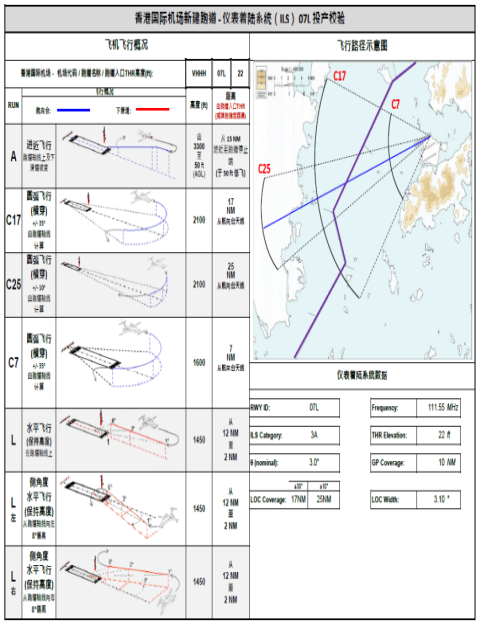
Customized flight inspection manual and report for international clients.

Provide New Tech validation and RFI services.

FLIGHT INSPECTION MANUAL

(FOR HONG KONG)

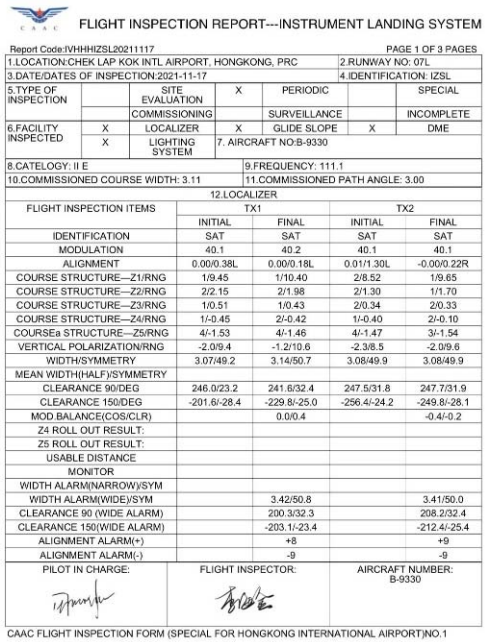
Edition 3.0


香港国际机场新建跑道 - 仪表着陆系统（ILS）07L 投产校验

飞机飞行概况

飞行路径示意图

仪表着陆系统数据


FLIGHT INSPECTION REPORT---INSTRUMENT LANDING SYSTEM

Report Code:IVHHHIZSL20211117 PAGE 1 OF 3 PAGES

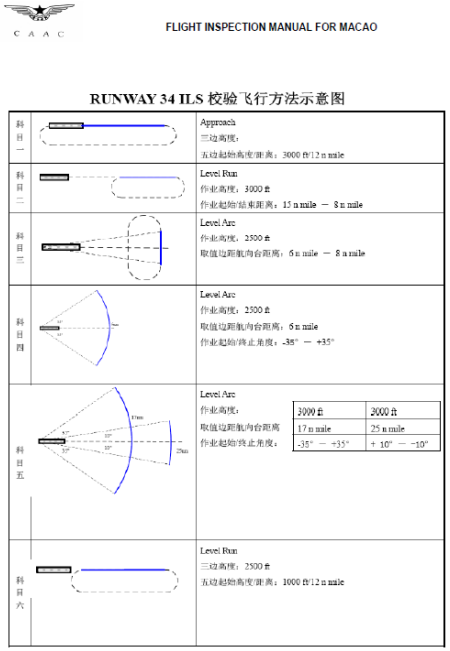
1.LOCATION:CHEK LAP KOK INTL AIRPORT, HONGKONG, PRC					2.RUNWAY NO: 07L		
3.DATE/DATES OF INSPECTION:2021-11-17					4.IDENTIFICATION: IZSL		
5.TYPE OF INSPECTION		SITE EVALUATION	X	PERIODIC		SPECIAL	
		COMMISSIONING		SURVEILLANCE		INCOMPLETE	
6.FACILITY INSPECTED	X	LOCALIZER	X	GLIDE SLOPE	X	DME	
	X	LIGHTING SYSTEM	7. AIRCRAFT NO:B-9330				
8.CATELOGY: II E			9.FREQUENCY: 111.1				
10.COMMISSIONED COURSE WIDTH: 3.11			11.COMMISSIONED PATH ANGLE: 3.00				

12.LOCALIZER

FLIGHT INSPECTION ITEMS	TX1		TX2	
	INITIAL	FINAL	INITIAL	FINAL
IDENTIFICATION	SAT	SAT	SAT	SAT
MODULATION	40.1	40.2	40.1	40.1
ALIGNMENT	0.00/0.38L	0.00/0.18L	0.01/1.30L	-0.00/0.22R
COURSE STRUCTURE---Z1/RNG	1/9.45	1/10.40	2/8.52	1/9.65
COURSE STRUCTURE---Z2/RNG	2/2.15	2/1.98	2/1.30	1/1.70
COURSE STRUCTURE---Z3/RNG	1/0.51	1/0.43	2/0.34	2/0.33
COURSE STRUCTURE---Z4/RNG	1/-0.45	2/-0.42	1/-0.40	2/-0.10
COURSEa STRUCTURE---Z5/RNG	4/-1.53	4/-1.46	4/-1.47	3/-1.54
VERTICAL POLARIZATION/RNG	-2.0/9.4	-1.2/10.6	-2.3/8.5	-2.0/9.6
WIDTH/SYMMETRY	3.07/49.2	3.14/50.7	3.08/49.9	3.08/49.9
MEAN WIDTH(HALF)/SYMMETRY				
CLEARANCE 90/DEG	246.0/23.2	241.6/32.4	247.5/31.8	247.7/31.9
CLEARANCE 150/DEG	-201.6/-28.4	-229.8/-25.0	-256.4/-24.2	-249.8/-28.1
MOD BALANCE(COS/CLR)		0.0/0.4		-0.4/-0.2
Z4 ROLL OUT RESULT:				
Z5 ROLL OUT RESULT:				
USABLE DISTANCE				
MONITOR				
WIDTH ALARM(NARROW)/SYM				
WIDTH ALARM(WIDE)/SYM		3.42/50.8		3.41/50.0
CLEARANCE 90 (WIDE ALARM)		200.3/32.3		208.2/32.4
CLEARANCE 150(WIDE ALARM)		-203.1/-23.4		-212.4/-25.4
ALIGNMENT ALARM(+)		+8		+9
ALIGNMENT ALARM(-)		-9		-9

PILOT IN CHARGE:	FLIGHT INSPECTOR:	AIRCRAFT NUMBER: B-9330

CAAC FLIGHT INSPECTION FORM (SPECIAL FOR HONGKONG INTERNATIONAL AIRPORT)NO.1


FLIGHT INSPECTION MANUAL FOR MACAO

RUNWAY 34 ILS 校验飞行方法示意图

Approach
三边高度，
五边起始高度/距离：3000 英尺/12 n mile

Level Run
作业高度：3000 英尺
作业起始/结束距离：15 n mile — 8 n mile

Level Arc
作业高度：2500 英尺
取值边距航向台距离：6 n mile — 8 n mile

Level Arc
作业高度：2500 英尺
取值边距航向台距离：6 n mile
作业起始/终止角度：-35° — +35°

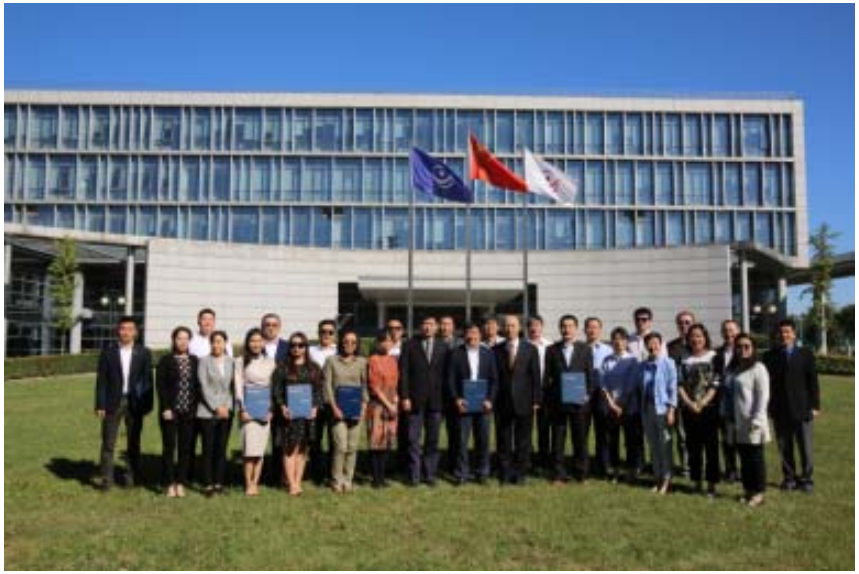
Level Arc

作业高度：	3000 英尺	2000 英尺
取值边距航向台距离	17 n mile	25 n mile
作业起始/终止角度：	-35° — +35°	+ 10° — -10°

Level Run
三边高度：2500 英尺
五边起始高度/距离：1000 英尺/12 n mile

International Activities – Exchanges & Visits

CAAC
中国民用航空飞行校验中心
FLIGHT INSPECTION CENTER OF CAAC



01 Brief of CFI

02 FI Capability

03 International Activities

04 Future Plan

Future Plan - Innovation

中国民用航空飞行校验中心
FLIGHT INSPECTION CENTER OF CAAC

Site Survey before construction

UAS-based Inspection

Air Laboratory for Avionics and other airborne equipment

Low Altitude Visual Charts Flight Validation

Air-Ground Data Integration

Beidou Airway Validation

Radio/GPS Interference Detection

New Tech Validation

Intelligent Civil Aviation

Future Plan - Bases

中国民用航空飞行校验中心
FLIGHT INSPECTION CENTER OF CAAC

Base Operation

Northwest
Under Planning

Headquarter
Beijing

Eastern
Nantong

Southwest
Under Planning

Southern
Zhuhai

中国民用航空飞行校验中心
FLIGHT INSPECTION CENTER OF CAAC

Flight Inspection Center of CAAC
Address: No.18 North Huoyun Road, Beijing, China 100621
Tel：010-64543298
Email：cuij@chinacfi.net

THANKS