Session 3 *Hazards and Mitigation Strategies for Incursions*

14:30	16:00	15 mins Pilot/Air Operator Perspective of Incursions Hazards and Proposed Mitigation Strategies	Captain Moulay Hicham Guenoun, IFALPA
		15 mins Airport Operator perspective of Incursion Hazards and Proposed Mitigation Strategies	Rishi Thakurdin, Airports Company South Africa, Group Manager Safety and Compliance
		30 mins Air Traffic Controller/ATC perspective of Incursion Hazards and Proposed Mitigation Strategies	Boni Dibate, CANSO, Director Africa Affairs
		30 min Panel	Ruby Sayyed, Assistant Director SO&I, IATA Middle East & North Africa
16:00	16:30	Break	

The pilot and airline operator's perspective on runway incursion hazards and mitigation options

Session 3
Presentation 1

By Captain Moulay Hicham Guenoun
AMPL COMITEC- IFALPA ALR

Hazard deafinition

" Hazard is a **conition** or an **object** with the **potential of causing** injuries to personnel, damage to equipment or structures, loss of material, or reduction of ability to perform a prescribed function."

(ICAO)

Risk Management

Operational Risk Management consists of three elements:

- Hazard Identification
- Risk assessment
- Risk mitigation

To make sure that all risks remain at an acceptable level.

Common hazard sources in aviation

- Design factors
- Procedures and operating practices
- Communications
- Personnel factors
- Organisational factors
- Work environment factors
- Regulatory oversight factors
- Defences

SMM ICAO DOC 9859

ICAO DEFINITION OF A RUNWAY INCURSION

"Any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and take-off of aircraft."

(PANS-ATM, Doc 4444)

IFALPA DEFINITION OF A RUNWAY INCURSION

Runway incursions are defined as any person, aircraft or vehicle that enters a runway by mistake. This definition includes aircraft attempting takeoff or landing on a runway other than the one assigned. Incursions present a significant threat to air safety

Runway Confusion

FSF DEFINITION OF A RUNWAY SAFETY ISSUE

- A **runway safety issue** is any safety issue that deals with the runway environment (or any surface being used as a runway) and the areas immediately adjacent to it (e.g., overruns, high-speed taxiways).

The ICAO definition of a hot spot

"A location on an aerodrome movement area with a history or potential risk of collision or runway incursion, and where heightened attention by pilots/drivers is necessary."

Collaborative approach

Efficient risk identification and mitigation can only be achieved fy collaboration between people from different backgrounds and work environements

Rabbit?
or
Duck?

The worst case scenario

1977 - KLM / Pan Am
Los rodeos

Runway Incursion Hazards

- Runway layout/usage
- Pilot-driver-controller communication
- Weather
- Airport
- ATC
- Ground vehicles

Operational Hazards

Workload issues during taxiing that can result in a loss of situational awareness:

- Completion of pre-departure checklists
- Second engine start requirements
- Coordinating amended ATC clearances
- Complex taxi routing

All have the potential to contribute to incursion risks

Operational Mitigations

Establish SOPs to minimize the number of tasks to be performed when aircraft is moving during taxiing, these include:

- FMS input
- Delayed engine start
- Briefings
- Weight & balance calculations

To maintain situational awareness on the ground:

- Use all available technologies (e.g. Airbus ROPS, RAAS)
- Use individual aerodrome charts
- Develop SOPs for ground navigation

Communication Hazards

Task overload of pilot attempting to communicate
- Flight deck: checklists and briefings
- Cabin crew: passenger safety or technical issues
- Dispatch, AIRINC or other services related to operational issues

Both pilots are focused on the communication issue
- Frequency congestion – an increasing factor at many airports

Message confusion
- Standard phraseology is not always used
- Reception is not always clear

The subsequent loss of situational awareness can result in:
- Runway incursion
- Taxiway incursion

Communication Mitigations

To achieve required standards

- **Use standard phraseology**
- **Listen before speaking**
- **Speak slowly**
- **When in doubt, seek clarification**
- **Ask open questions**

To avoid non essential communication

- **Adopt sterile cockpit concept**

To avoid communication impediments in multi-crew cockpit

- **Define the role of each pilot**
- **CRM training on communication techniques**
- **Manage the cockpit workload**

Visibility Hazards

Factors that can result in a crew being unsure of their position:

- Not only due to fog or other "low visibility" phenomena
- Visibility may be an issue in clear weather due to glare or reflection (snow or water) – potential for confusion issues when landing on closely spaced parallel runways

Visibility hazards generally increase pilot workload and increase incursion risk

Visibility Mitigations

→ **Use all available technologies to maintain situational awareness on the ground**

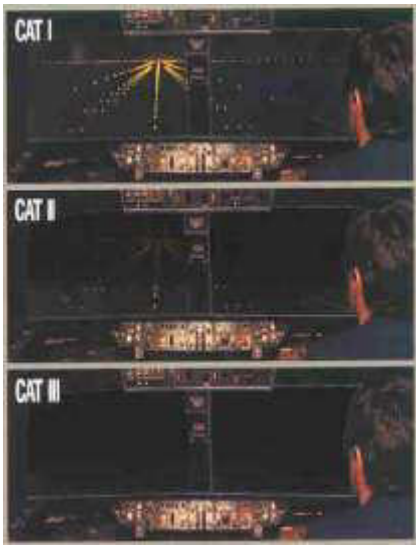
CAT III landings have become routine, but the aircraft must still be taxied manually in low visibility operations

→ **Establish low visibility procedures, including enhanced crew coordination, when conditions require**

Inability to see other aircraft on runway

→ **Use full runway length operations especially in marginal conditions**

→ **Realistic training for all low visibility operations**



Signage

Signage may be complex, inadequate or not clearly visible

Complexity

Inappropriate positioning

Establish a reporting system that includes reporting signage deficiencies

Airport Design Hazards

Boston, 14 July 2011

Factors that contribute to positional uncertainty

- Multiple runway and taxiway intersections
- Converging intersections at various angles
- Closely spaced parallel runways
  - Failure to hold short after landing
  - Runway confusion risk, especially for low visibility landing operations
- Runways in close proximity to terminal aprons

Airport Design Mitigations

Boston, 14 July 2011

- **Conduct briefing prior to all operations**
- **Use individual airport charts**
- **Identify high risk locations**
- **Implement SOPs for operations at airports with known design hazards**

Construction Hazards and Mitigation

Runway confusion

- Operations on closed runways
- Runways as taxiways
- Use of non-standard taxiways

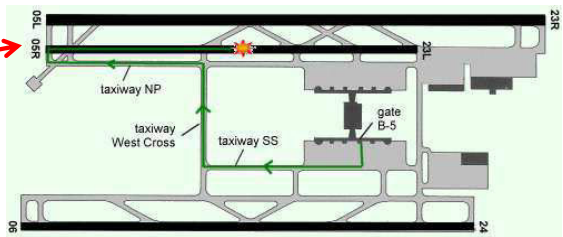
Airline operators establish comprehensive guidance for operations during airport works

Conduct comprehensive pre-taxi briefing

Cross-check all performance data before using

Hazards appear when part of the airport becomes non-operational

SQ 006 in Taipei – October 2000

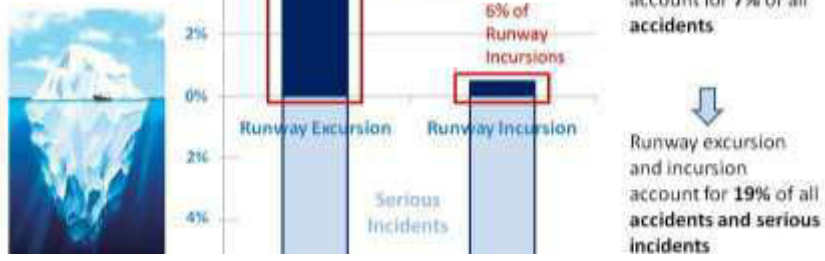


Runway incursions recurring scenarios

- An aircraft or vehicle crossing in front of a landing aircraft
- An aircraft or vehicle crossing in front of an aircraft taking off
- An aircraft or vehicle crossing the runway-holding position marking
- An aircraft or vehicle unsure of its position and inadvertently entering an active runway
- A breakdown in communications leading to failure to follow an air traffic control instruction
- An aircraft passing behind an aircraft or vehicle that has not vacated the runway

To a proactive approach

Scheduled Commercial Traffic – MTOW > 2 250 kg (Yrs 2006- 2010)



THANK YOU

ICAO RUNWAY SAFETY SEMINAR

AGADIR, MOROCCO, 10th – 12th APRIL 2013

AIRPORTS COMPANY SOUTH AFRICA

RUNWAY SAFETY – INCURSION PREVENTION

SIGNAGE, MARKINGS AND LIGHTING

Presentation by **RISHI THAKURDIN**

AIRPORTS COMPANY SOUTH AFRICA

RUNWAY SAFETY INCURSIONS

AIRPORTS COMPANY SOUTH AFRICA

Description

ICAO defines a RUNWAY INCURSION to be:

"Any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and take-off of aircraft."

RUNWAY SAFETY INCURSIONS

AIRPORTS COMPANY SOUTH AFRICA

HOW DO WE PREVENT THIS FROM OCCURRING IN THE FIRST PLACE?

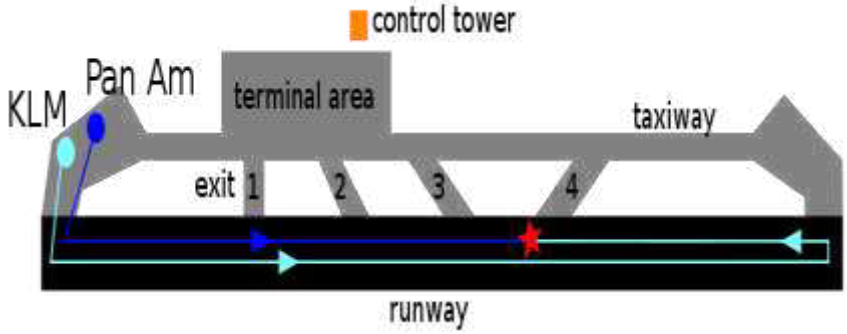
WORST RUNWAY INCURSION EVENT IN HISTORY

TENERIFE NORTH 27TH MARCH 1977

KLM 747-200 & PAN AM 747-100 583 FATALITIES

DECISION MADE BY ONE MAN WHO IGNORED POTENTIAL CREW WARNINGS

KL TOOK OFF IN FOG WITHOUT ATC CLEARANCE WHILST PA WAS STILL ON THE RUNWAY



RUNWAY INCURSION AWARENESS TRAINING DID NOT RESULT FROM THIS CATASTROPHIC ACCIDENT BUT, CRUCIALLY, SOMETHING ELSE CONSIDERED JUST AS IMPORTANT DID RESULT ……. **CRM**

CRM – CREW RESOURCE MANAGEMENT

CRM HAS SINCE PREVENTED MANY INCURSIONS

RUNWAY INCURSION – MILAN
SAS MD-80 & CITATION JET
118 FATALITIES

RUNWAY INCURSION – MILAN
SAS MD-80 & PRIVATE CITATION

CREW DISORIENTATION COMPOUNDED BY POOR MARKINGS AND SIGNAGE

RUNWAY INCURSION – TAIPEI
SQ B744 & WORKING VEHICLES
83 FATALITIES

RUNWAY INCURSION – TAIPEI
SQ B744 & VEHICLES ON RUNWAY

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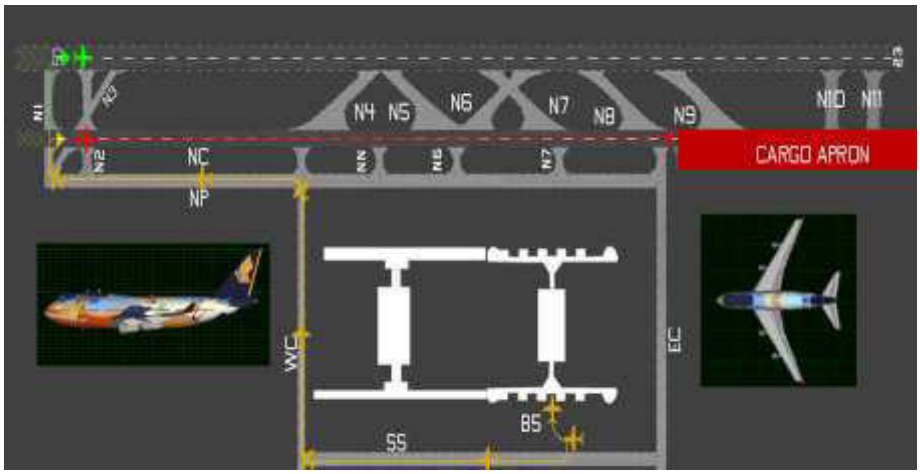

FAILURE TO BARRIER OFF CLOSED RUNWAY TO PREVENT AIRCRAFT ACCESS

RUNWAY INCURSION – TAINAN
GE A321 & VEHICLE ON RUNWAY
NIL FATALITIES

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RUNWAY INCURSION – TAINAN
GE A321 & VEHICLE ON RUNWAY
NO DEAD IS NOT ANY LESS SEVERE

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UNESCORTED CONTRACTOR NOT RADIO EQUIPPED ENTERING RUNWAY

ANNEX 14 IS ALL WE HAVE IN COMMON TO TRY AND ENSURE RUNWAY SAFETY IS ASSURED

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RUNWAY SAFETY
THE BASIC APPROACH

ICAO Annex 14 proposes only 3 methods of achieving runway safety, namely:

- **SIGNAGE**
- **MARKINGS**
- **LIGHTING**

ICAO Annex 14 proposes only 2 methods of enhancing runway safety, namely:

- **RUNWAY DESIGNATOR MODIFICATION**
- **TAXIWAY CENTRELINE MODIFICATION**

RUNWAY SAFETY
THE BASIC PROBLEM

1. ICAO Annex 14 clearly makes any enhancements for improvements to runway safety to be a recommendation only, and NOT a standard to be adopted.
2. ICAO Annex 14 SARPS for signage, markings and lighting take aircraft into consideration as part of runway safety, but tend to ignore vehicles and people as part of runway safety.
3. Most national regulators do not make additional provisions for enhanced runway safety in their own legislation, e.g. SACAA. Of those regulators that do make additional provisions, each has a different mix of enhancements to be utilised, e.g. FAA, UKCAA, CASA.
4. Aerodrome Operators have no clear guidance of ensuring standardisation when using runway safety enhancements.

RUNWAY SAFETY
THE SOLUTIONS OFFERED

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1. **The Obvious** (ICAO Annex 14 Standards)
2. **The Not So Obvious** (ICAO Annex 14 Recommendations)
3. **The Obscure** (ICAO Annex 14 Recommendations)
4. **The Slightly Obscure** (Local Variations by National Regulators)
5. **The Very Obscure** (Vehicle and People Protection)
6. **The Little Known** (Non Physical Suggestions within ICAO)

LET US TAKE A LOOK AT THEM ONE AT A TIME

RUNWAY SAFETY – INCURSION PREVENTION
THE OBVIOUS
ICAO ANNEX 14 STANDARDS

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VISUAL RUNWAY HOLDING POINT MARKING – PATTERN A

RUNWAY SAFETY – INCURSION PREVENTION
THE OBVIOUS
ICAO ANNEX 14 STANDARDS

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MANDATORY RUNWAY DESIGNATOR SIGN ONLY – NO LOCATION SIGN

RUNWAY SAFETY – INCURSION PREVENTION
THE OBVIOUS
ICAO ANNEX 14 STANDARDS

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RUNWAY HOLDING POINT MARKING FOR CAT ILS LANDINGS – PATTERN B

RUNWAY SAFETY – INCURSION PREVENTION
THE NOT SO OBVIOUS
ICAO ANNEX 14 RECOMMENDATIONS

AIRPORTS COMPANY SOUTH AFRICA

LOCATION SIGN ATTACHED TO MANDATORY RUNWAY DESIGNATOR SIGN

RUNWAY SAFETY – INCURSION PREVENTION
THE OBVIOUS
ICAO ANNEX 14 STANDARDS

AIRPORTS COMPANY SOUTH AFRICA

MANDATORY RUNWAY DESIGNATOR FOR PATTERN B HOLD WITH LOCATION

RUNWAY SAFETY – INCURSION PREVENTION
THE NOT SO OBVIOUS
ICAO ANNEX 14 RECOMMENDATIONS

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RUNWAY GUARD LIGHTS – ONLY FOR USE IN RVR <550M IF NO STOP BAR

RUNWAY SAFETY – INCURSION PREVENTION
THE NOT SO OBVIOUS
ICAO ANNEX 14 RECOMMENDATIONS

AIRPORTS COMPANY SOUTH AFRICA

RUNWAY STOP BAR LIGHTS - ONLY FOR USE IN RVR <350M

RUNWAY SAFETY – INCURSION PREVENTION
THE OBSCURE
ICAO ANNEX 14 RECOMMENDATIONS

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ENHANCED TAXIWAY CENTRELINE MARKING
EXISTING TAXIWAY CENTRELINE HAS DASHED SIDE STRIPES BOTH SIDES OF THE CENTRELINE GOING BACK 45M FROM THE RUNWAY HOLDING POINT

RUNWAY SAFETY – INCURSION PREVENTION
THE OBSCURE
ICAO ANNEX 14 RECOMMENDATIONS

AIRPORTS COMPANY SOUTH AFRICA

ENHANCED RUNWAY DESIGNATOR MARKING FOR UP TO CODE D TAXIWAYS
ONE DESIGNATOR PLACED CENTRALLY ACROSS THE TAXIWAY CENTRELINE LOCATED IMMEDIATELY BEFORE THE RUNWAY HOLDING POINT MARKING

RUNWAY SAFETY – INCURSION PREVENTION

THE OBSCURE

ICAO ANNEX 14 RECOMMENDATIONS

AIRPORTS COMPANY SOUTH AFRICA

ENHANCED RUNWAY DESIGNATOR MARKING FOR CODE E AND F TAXIWAYS
TWO DESIGNATORS PLACED EITHER SIDE OF THE TAXIWAY CENTRELINE LOCATED IMMEDIATELY BEFORE THE RUNWAY HOLDING POINT MARKING

RUNWAY SAFETY – INCURSION PREVENTION

THE OBSCURE

ICAO ANNEX 14 RECOMMENDATIONS

AIRPORTS COMPANY SOUTH AFRICA

ENHANCED RUNWAY DESIGNATOR MARKING WITH LOCATION
DESIGNATOR PLACED EITHER SIDE OF THE TAXIWAY CENTRELINE WITH LOCATION IMMEDIATELY BEFORE THE RUNWAY HOLDING POINT MARKING

RUNWAY SAFETY – INCURSION PREVENTION
THE SLIGHTLY OBSCURE
LOCAL REGULATOR RECOMMENDATIONS

AIRPORTS COMPANY SOUTH AFRICA

ENHANCED MARKING WARNING OF RUNWAY (ABBREVIATED) AHEAD
TRIALLED BY FRENCH AND SWISS REGULATORS BUT WITH NO ENHANCED CENTRELINE TO STRENGTHEN THE RUNWAY AHEAD WARNING

RUNWAY SAFETY – INCURSION PREVENTION
THE SLIGHTLY OBSCURE
LOCAL REGULATOR RECOMMENDATIONS

AIRPORTS COMPANY SOUTH AFRICA

ENHANCED MARKING WARNING OF RUNWAY (ABBREVIATED) AHEAD
AS SEEN FROM AIR FRANCE CONCORDE AT PARIS (CDG)

RUNWAY SAFETY – INCURSION PREVENTION
THE SLIGHTLY OBSCURE
LOCAL REGULATOR RECOMMENDATIONS

AIRPORTS COMPANY SOUTH AFRICA

ENHANCED MARKING WARNING OF RUNWAY (UNABBREVIATED) AHEAD
TRIALLED BY UKCAA AND BAA AT LONDON HEATHROW (LHR) BUT WITH NO ENHANCED CENTRELINE TO STRENGTHEN THE RUNWAY AHEAD WARNING

RUNWAY SAFETY – INCURSION PREVENTION
THE SLIGHTLY OBSCURE
LOCAL REGULATOR RECOMMENDATIONS

AIRPORTS COMPANY SOUTH AFRICA

ENHANCED MARKING WARNING OF RUNWAY AHEAD
CURRENT RECOMMENDATION BY UKCAA BUT NOW WITH MARKING PLACED ACROSS TAXIWAY IMMEDIATELY BEFORE START OF ENHANCED CENTRELINE

RUNWAY SAFETY – INCURSION PREVENTION
THE SLIGHTLY OBSCURE
LOCAL REGULATOR RECOMMENDATIONS

AIRPORTS COMPANY SOUTH AFRICA

CRITICAL ILS BOUNDARY MANDATORY SIGN AT PATTERN B HOLDING POINT
VARIATION RECOMMENDED BY FAA WHERE MANDATORY HOLDING POINT FOR ILS HOLD IS NOT IDENTIFIED BY ADDITIONAL RUNWAY DESIGNATOR

RUNWAY SAFETY – INCURSION PREVENTION
THE SLIGHTLY OBSCURE
LOCAL REGULATOR RECOMMENDATIONS

AIRPORTS COMPANY SOUTH AFRICA

ENHANCED RUNWAY DESIGNATOR MARKING AT PATTERN B HOLDING POINT
DESIGNATOR PLACED CENTRALLY ACROSS THE TAXIWAY CENTRELINE INDICATING UP TO CODE D IMMEDIATELY BEFORE THE CAT II HOLDING POINT

RUNWAY SAFETY – INCURSION PREVENTION
THE SLIGHTLY OBSCURE
LOCAL REGULATOR RECOMMENDATIONS

AIRPORTS COMPANY SOUTH AFRICA

ENHANCED ILS DESIGNATOR MARKING AT PATTERN B HOLDING POINT
DESIGNATOR PLACED ACROSS THE TAXIWAY AT 45M INTERVALS IF THE TAXIWAY EXCEEDS 60M IN WIDTH TO INDICATE CAT II OR CAT III HOLD POINT

RUNWAY SAFETY – INCURSION PREVENTION
THE SLIGHTLY OBSCURE
LOCAL REGULATOR RECOMMENDATIONS

AIRPORTS COMPANY SOUTH AFRICA

ENHANCED VARIABLE MESSAGE SIGNAGE AT RUNWAY HOLDING POINT
TRIALLED BY JAPANESE CAA AT TOKYO NARITA TO STRENGTHEN EXISTING RUNWAY INCURSION PREVENTION MEASURES – SIGN SHOWING "**STOP**"

RUNWAY SAFETY – INCURSION PREVENTION
THE SLIGHTLY OBSCURE
LOCAL REGULATOR RECOMMENDATIONS

AIRPORTS COMPANY SOUTH AFRICA

ENHANCED VARIABLE MESSAGE SIGNAGE AT RUNWAY HOLDING POINT
TRIALLED BY JAPANESE CAA AT TOKYO NARITA TO STRENGTHEN EXISTING RUNWAY INCURSION PREVENTION MEASURES – SIGN SHOWING BLANK

RUNWAY SAFETY – INCURSION PREVENTION
THE SLIGHTLY OBSCURE
LOCAL REGULATOR RECOMMENDATIONS

AIRPORTS COMPANY SOUTH AFRICA

IN USE AT LONDON HEATHROW - UPRIGHT RUNWAY AHEAD WARNING SIGN USED AT RUNWAY HOLDING POINT – CAN ALSO BE USED FOR ROADWAYS

RUNWAY SAFETY – INCURSION PREVENTION
BRISTOL UK - BEST PRACTICE OF ICAO SARPS AND LOCAL REGULATOR RECOMMENDATIONS GIVING SEVEN LAYERS OF PROTECTION

AIRPORTS COMPANY SOUTH AFRICA

1. Enhanced Runway Ahead, 2. Enhanced Centreline, 3. Stop Bar, 4. Enhanced Runway Designator, 5. Runway Hold Marking, 6. Guard Lights, 7. Illuminated Signage

RUNWAY SAFETY – INCURSION PREVENTION
SIGNAGE AND MARKINGS MUST PREVENT UNAUTHORISED VEHICLE ACCESS

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VEHICLE PROTECTION

RUNWAY SAFETY – INCURSION PREVENTION
THE OBVIOUS
ANNEX 14 STANDARD

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VEHICLE STOP WITH INSTRUCTION AND USING VEHICULAR LOCATION

RUNWAY SAFETY – INCURSION PREVENTION
THE OBVIOUS
ANNEX 14 STANDARD

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STOP SIGNAGE WITH INSTRUCTION NOTICE BUT NO LOCATION AT ROADWAY JUNCTION WITH TAXIWAYS AND/OR RUNWAYS AS RECOMMENDED BY UKCAA

RUNWAY SAFETY – INCURSION PREVENTION
THE OBVIOUS
ANNEX 14 STANDARD

AIRPORTS COMPANY SOUTH AFRICA

LOW VARIATION OF VEHICLE STOP SIGN IN USE AT HOLDING POINT AT LHR

RUNWAY SAFETY – INCURSION PREVENTION
THE OBSCURE
ANNEX 14 STANDARD

AIRPORTS COMPANY SOUTH AFRICA

INSTRUCTION SIGN ONLY - NO STOP SIGN - USE ON ROADWAY AT EDINBURGH

RUNWAY SAFETY – INCURSION PREVENTION
THE OBSCURE
VEHICLE PROTECTION

AIRPORTS COMPANY SOUTH AFRICA

INSTRUCTION SIGN BUT USE OF NO RIGHT TURN USED ON ROADWAY AT CPT

RUNWAY SAFETY – INCURSION PREVENTION
THE SLIGHTLY OBSCURE
LOCAL REGULATOR RECOMMENDATIONS

AIRPORTS COMPANY SOUTH AFRICA

UNCONTROLLED VEHICLE CROSSING OF LIVE TAXIWAY WITH GOOD USE OF SURFACE MARKINGS (HOLD/STOP & ZIPPER), SIGNAGE AND WARNING LIGHTS

RUNWAY SAFETY – INCURSION PREVENTION
THE VERY OBSCURE
VEHICLE PROTECTION

AIRPORTS COMPANY SOUTH AFRICA

A VARIATION SIGN USING STOP WITHOUT INSTRUCTION – BUT WITH WARNING USED AT AN AIRFIELD WITH VEHICLE RUNWAY ACCESS BUT NO ATC

RUNWAY SAFETY – INCURSION PREVENTION
THE VERY OBSCURE
VEHICLE PROTECTION

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A CHEAP AND EFFECTIVE ALTERNATIVE USED AT A SMALL RURAL AIRFIELD WITHOUT ATC COVER AND WITH ROADWAY ACCESS TO RUNWAY

RUNWAY SAFETY – INCURSION PREVENTION
SIGNAGE AND MARKINGS MUST PREVENT UNAUTHORISED PEOPLE ACCESS

AIRPORTS COMPANY SOUTH AFRICA

PEOPLE PROTECTION

RUNWAY SAFETY – INCURSION PREVENTION
THE VERY OBSCURE
VEHICLE AND PEOPLE PROTECTION

AIRPORTS COMPANY SOUTH AFRICA

A CHEAP AND EFFECTIVE ALTERNATIVE USED AT A SMALL RURAL AIRFIELD WITH NO ATC COVER AND WITH BOTH PATH AND ROAD ACCESS TO RUNWAY

RUNWAY SAFETY – INCURSION PREVENTION
THE VERY OBSCURE
VEHICLE AND PEOPLE PROTECTION

AIRPORTS COMPANY SOUTH AFRICA

WARNING SIGNAGE USED AT SMALL RURAL AIRFIELD WITH ROADWAY ACCESS ON TO RUNWAY AND USED BY BOTH VEHICLES AND PEOPLE

RUNWAY SAFETY – INCURSION PREVENTION
THE VERY OBSCURE
PEOPLE PROTECTION

AIRPORTS COMPANY SOUTH AFRICA

A STERN WARNING WITH LEGAL THREAT USED IN THE UK TO DETER PEOPLE FROM TRESPASSING AT ANY AIRFIELD AND PREVENT RUNWAY INCURSION

RUNWAY SAFETY – INCURSION PREVENTION
THE LITTLE KNOWN
RECOMMENDATIONS HIDDEN WITHIN ICAO

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ADVANCED SURFACE MOVEMENT GUIDANCE CONTROL – TRANSPONDER SIGNAL MONITORS AIRCRAFT ON GROUND MOVEMENT RADAR

RUNWAY SAFETY – INCURSION PREVENTION
THE LITTLE KNOWN
RECOMMENDATIONS HIDDEN WITHIN ICAO

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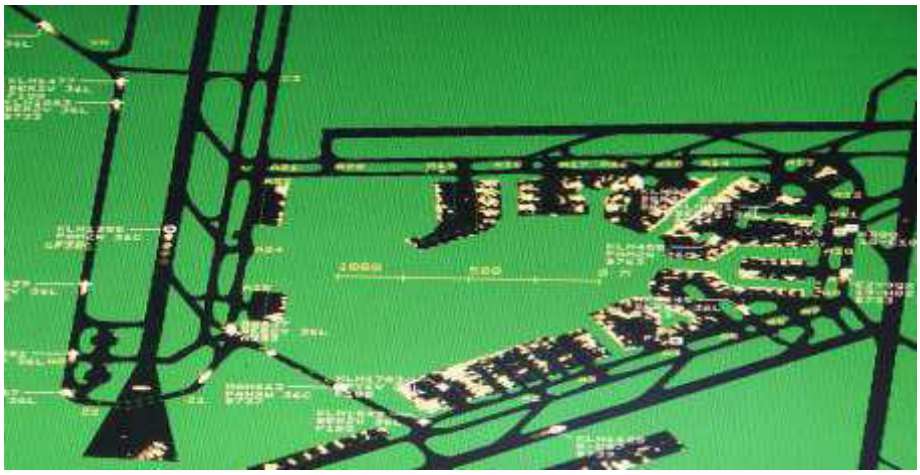

GROUND MOVEMENT RADAR – USED BY ATC AS PART OF ASMGC TO MONITOR NOT ONLY AIRCRAFT ON THE GROUND, BUT ALSO OPERATIONAL VEHICLES

RUNWAY SAFETY – INCURSION PREVENTION
THE LITTLE KNOWN
RECOMMENDATIONS HIDDEN WITHIN ICAO

AIRPORTS COMPANY SOUTH AFRICA

SQUID TRANSPONDER, LINKED TO ASMGC, FITTED TO ROOF OF ALL AIRSIDE VEHICLES WHO NEED OPERATIONAL ACCESS TO TAXIWAYS AND RUNWAYS

RUNWAY SAFETY – INCURSION PREVENTION
THE LITTLE KNOWN
RECOMMENDATIONS HIDDEN WITHIN ICAO

AIRPORTS COMPANY SOUTH AFRICA

SQUID TRANSPONDER, LINKED TO ASMGC, FITTED TO ROOF OF ALL AIRSIDE VEHICLES WHO NEED OPERATIONAL ACCESS TO TAXIWAYS AND RUNWAYS

RUNWAY SAFETY – INCURSION PREVENTION
THE LITTLE KNOWN
RECOMMENDATIONS HIDDEN WITHIN ICAO

AIRPORTS COMPANY SOUTH AFRICA

SQUID TRANSPONDERS ALSO FITTED TO THOSE SERVICE AND MAINTENANCE VEHICLES WHO OPERATE CLOSE TO OR ON TAXIWAYS AND RUNWAYS

RUNWAY SAFETY – INCURSION PREVENTION
THE LITTLE KNOWN
RECOMMENDATIONS HIDDEN WITHIN ICAO

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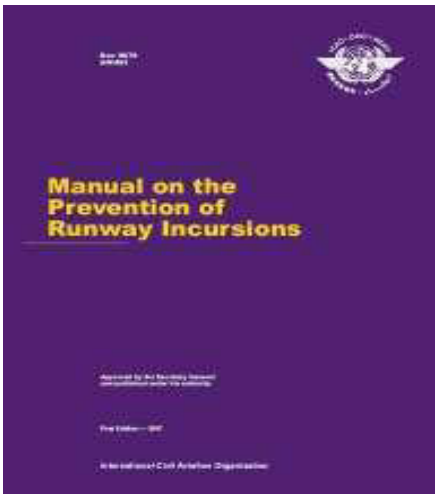

ICAO Doc 9870 MANUAL ON THE PREVENTION OF RUNWAY INCURSIONS

RUNWAY SAFETY – INCURSION PREVENTION
THE LITTLE KNOWN
RECOMMENDATIONS HIDDEN WITHIN ICAO

AIRPORTS COMPANY SOUTH AFRICA

ICAO DOC 9870

CHAPTER 3.1

Establishing a Runway Incursion Prevention Programme

3.1 RUNWAY SAFETY TEAMS

3.1.1 A runway incursion prevention programme should start with the establishment of runway safety teams at individual aerodromes.

3.1.2 The team should comprise representatives from aerodrome operations, air traffic service providers, airlines or aircraft operators, pilot associations and any other groups with a direct involvement in runway operations.

RUNWAY SAFETY – INCURSION PREVENTION
THE LITTLE KNOWN
RECOMMENDATIONS HIDDEN WITHIN ICAO

AIRPORTS COMPANY SOUTH AFRICA

ACSA HAS 4 LOCAL RUNWAY SAFETY TEAMS ALREADY SET UP AT:

O.R.TAMBO INTERNATIONAL AIRPORT / JNB / FAJS	1 SA / 1 Afr
CAPE TOWN INTERNATIONAL AIRPORT / CPT / FACT	2 SA / 3 Afr
KING SHAKA INTERNATIONAL AIRPORT / DBN / FALE	3 SA / 9 Afr
PORT ELIZABETH INTERNATIONAL AIRPORT / PLZ / FAPE	4 SA / 22 Afr

CAPE TOWN was the **first Sub-Saharan LRST**, and **ACSA** the second airports group on the African Continent to have an LRST programme, following the Moroccan Airports Authority in October 2010. **Cape Town LRST** was inaugurated in **April 2011** and **fully established in July 2011**. All 5 remaining ACSA regional airports will follow in 2013 and will be complete by year end.

All LRSTs comprise ACSA (all operational departments), ATNS, ALPA-SA, Airlines (Line Pilots), AMOs, Non-Scheduled/Biz/GA Reps, major Stakeholders (Handlers etc.). It also includes SACAA representation.

RUNWAY SAFETY – INCURSION PREVENTION
THE LITTLE KNOWN
RECOMMENDATIONS HIDDEN WITHIN ICAO

AIRPORTS COMPANY SOUTH AFRICA

ICAO DOC 9870

CHAPTER 3.4

HOTSPOTS

Many aerodromes have hazardous locations on runways and/or taxiways where incursion incidents have occurred, sometimes frequently. Any such position is commonly referred to as a "**hotspot**".

Definition

ICAO Doc 9870, Manual on the Prevention of Runway Incursions defines a "**hotspot"** as "A location on an aerodrome movement area with a history or potential risk of collision or runway incursion, and where heightened attention by pilots/drivers is necessary."

RUNWAY SAFETY – INCURSION PREVENTION
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DOC 9870

CHAPTER 3.4.2

USE THE AIP TO PROMULGATE HOTSPOTS TO ALL

Formal definition of **hotspots** can alert pilots and drivers to movement area design issues which cannot be readily mitigated by signage, markings, lighting or where poor visibility may contribute to reduced situational awareness in relation to active runways. It can also alert to potentially critical points where the ATC visual control room (VCR) or other surveillance systems are less effective than on a particular aerodrome generally.

ICAO recommends the local generation of AIP charts to show runway **hotspots**, which, once issued, must be kept up to date and revised as necessary.

RUNWAY SAFETY – INCURSION PREVENTION
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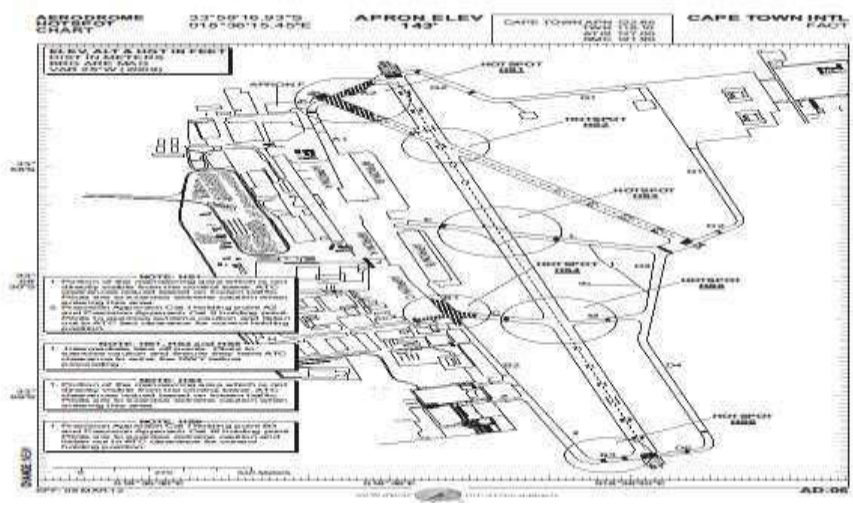

CAPE TOWN **HOTSPOT CHART** AS SHOWN IN THE AIP AND USED BY JEPPESEN

RUNWAY SAFETY – INCURSION PREVENTION
THE LITTLE KNOWN
RECOMMENDATIONS HIDDEN WITHIN ICAO

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DOC 9870
CHAPTER 3.8
EDUCATION AND AWARENESS

RUNWAY SAFETY – INCURSION PREVENTION
THE LITTLE KNOWN
RECOMMENDATIONS HIDDEN WITHIN ICAO

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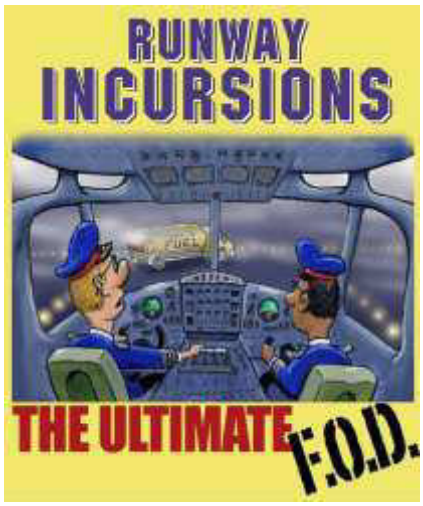

RUNWAY INCURSION AWARENESS SAFETY CAMPAIGN USING POSTERS

RUNWAY SAFETY – INCURSION PREVENTION
HOW IS SOUTH AFRICA DOING IN THE RUNWAY INCURSION SAFETY STAKES?

AIRPORTS COMPANY SOUTH AFRICA

ATNS STATISTICS

FROM THE **LAST 33 MONTHS**
AS REPORTED BY **22 SEPERATE AIRPORTS** IN SA

RUNWAY INCURSIONS : 204 TOTAL
INCURSION AVERAGE : 6.2 PER MONTH

ALMOST ALL INCURSIONS OCCURRED AT SMALL AIRPORTS WHERE FLYING SCHOOL AND OWNER/OPERATOR GENERAL AVIATION ACTIVITY CONSITUTE THE MAJORITY OF MOVEMENTS

WE STILL HAVE A LOT OF WORK TO DO

LAST THOUGHT

WE NOW NEED TO THINK BIGGER ON THIS IMPORTANT SUBJECT .

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RUNWAY SAFETY – INCURSION PREVENTION

TOLL BOOTH – ULTIMATE PROTECTION

GUARANTEED TO HAVE NO INCURSIONS
AS PILOTS ALWAYS CLAIM TO HAVE NO CASH!!

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THANK YOU FOR LISTENING

The air traffic controller's perspective on runway incursion hazards and mitigation options

Session 3
Presentation 3

Communication Hazards

- Unclear communication from the pilot to the ATC
- Ambiguous communication
- Lack of standard phraseology, including: speed of delivery, accents, # of instructions per transmission
- Low level of aviation language proficiency
- Frequency congestion
- Call sign confusion
- Read back errors
- Assumption that flight crews and airport personnel have certain familiarity with airport
- Simultaneous communication required for coordination between local, ground and radar controllers
- Multiple tower / ground frequencies becoming commonplace at many large airports
- Instances where 1 controller is responsible for traffic on multiple frequencies

Communication Mitigation

- Provide awareness and refresher training, that includes
  - Situations *requiring* mandatory read back
  - Ensuring what is said or heard *is really* what is said or heard not what you or the pilot *expected* to hear
  - Clarifying/avoiding similar sounding call-signs
  - Not assuming that pilots are familiar with local operations
- Establish outreach programs that include
  - Providing runway safety materials to foster collaboration
  - Encouraging the use of standard phraseology between controllers and pilots
  - Airfield vehicular tours to familiarize controllers with aerodrome signage, markings and taxiway/runway layout from a pilot's perspective
- Minimize single controller communication coordination between local, ground and radar controllers
- Manage the use of multiple tower / ground frequencies
- Minimize the occurrences where 1 controller is responsible for traffic on multiple frequencies

Construction Hazards

Hazards appear when part of the airport becomes non-operational

- Potential capacity constraints that increase controller workload
- Potential need to manage and coordinate increased number of runway crossings
  - The more crossing possibilities, the higher the incursion risk
- Added vehicular traffic on runway and taxiway surfaces
- Possible increased use of intersection takeoffs
- Potential impact on RFF procedures

Construction Mitigations

- Manage movement numbers during capacity constraints
- Manage and coordinate increased number of runway crossings
- Develop SOPs for use during airport works including
  - Using intersection departures
  - RFF procedures
  - Providing information to pilots on available runway lengths
- Develop memory aids to prevent departures and landings on closed or shortened runways

Airport Design Hazards

- Operations to closely spaced parallel runways
  - Monitoring adherence to hold short clearances, particularly for high-speed turnoffs after landing
  - Potential for separation issues related to runway confusion
- Simultaneous operations to intersecting runways
  - Increased coordination required when multiple tower / ground frequencies are in use

Airport Design Mitigation

- Identify and publish hotspots
  - Develop controller awareness of high risk areas
- Intersecting runway operations
  - Land and Hold Short Operations
  - Timing (when runway occupancy time is contrary to controller expectations)
- Runway Crossings
  - There is a correlation between the number of runway crossings and runway incursions consider increasing the use of end around taxiways.

Airport Design Mitigation

- Blind spots/low visibility
  - Reports clear of runway
  - Use of Surface surveillance equipment including CCTV if needed
- Closely spaced parallel runways operations
  - Monitoring adherence to hold short clearances, particularly for high-speed turnoffs after landing
  - Awareness of separation issues related to runway confusion
- Simultaneous operations to intersecting runways
  - Implement coordination procedures when multiple tower/ ground frequencies are in use

Visibility Hazards

Not only due to fog, but also glare/snow/ reflection/water/sand

Certain movement areas are “blind spots” and are not visible from the control tower

Visibility Mitigation

- Identify “blind spots” and their hazards
  - Develop mitigation procedures
- Utilize low visibility procedures
- Manage traffic levels
  - To maintain situation awareness
  - To avoid frequency overload

Operational Hazards

- "Hub" route networks create peaks in controller workload
- Managing contingencies related to:
  - Runway / taxiway closures
  - Inoperative approach aids
  - Technical issues experienced by flight crews
  - Weather phenomena
- Environmental factors:
  - Cab design,
  - Cab noise,
  - Distractions, false/nuisance alerts
  - Sight lines
- Complex airport operations and configuration changes
- Traffic volume
- Shift work and fatigue-related performance effects
- Use of complex/non-standard taxi instructions
- Inadequate airport diagrams

Operational Mitigation

- Options to enhance situational awareness
  - Implement CRM training
    - Foster a culture of teamwork. Awareness of other controllers' activities.
  - Develop memory aids
    - Visual indicators for runway closures, intersection departures, etc
    - Position Relief Procedures and Checklists to highlight any high risk situations
  - Staffing
    - Provide adequate numbers to manage traffic surges
    - Prevent split attention/multi-tasking particularly during periods of low-level traffic
  - Re-Current training
    - Focus on local operations and runway safety issues
  - Tower cab & equipment configuration
    - Perform human factors assessment of cab environment
- Foster a Safety Culture
  - Implement SMS

Signage

- Report unserviceable signage
- Advise flight crews of unserviceable signage
- Amend affected procedures when signage is unserviceable

THANK YOU