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RUNWAY SAFETY FRAMEWOREK**EAC 0019**
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RUNWAY SAFETY FRAMEWORK

Chapter 1. **Introduction**

1.1 Runway Safety is a vital component of aviation safety as a whole. The predicted growth in air traffic implies that the actual numbers of incidents may rise, unless held in check by preventative actions.

1.2 Following a survey of Pilots, Air Traffic Controllers and airport operator conducted regarding runway safety, runway incursions were identified as one of the most serious safety issues.

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

1.4 Types of Runway Incursions

1.4.1 Operational Errors

- An operational error (OE) is an action of an Air Traffic Controller (ATC) that results in:
 - Less than the required minimum separation between two or more aircraft, or between an aircraft and obstacles (obstacles include vehicles, equipment, and personnel on runways).
 - An aircraft landing or departing on a runway closed to aircraft.

1.4.2 Pilot Deviations

- A pilot deviation (PD) is an action of a pilot that violates any civil Aviation Regulation. For example, a pilot fails to comply with air traffic control instructions to not cross an active runway when following the authorized route to an airport gate.

1.4.2 Vehicle/Pedestrian Deviations

- A vehicle or pedestrian deviation (V/PD) includes pedestrians, vehicles or other objects interfering with aircraft operations by entering or moving on the runway without authorization from air traffic control.

1.5 Contributing Factors

1.5.1 High Traffic Volumes

1.5.2 Traffic Mix (wide bodied/general aviation)

1.5.3 Low Visibility Conditions

1.5.4 Mixed Languages in ATC communication

1.5.5 Temporary works /maintenance activities.

1.5.6 Airfield Configuration

- Poor design
- Confusing layout
- Complex layout
- Difficult topography

1.5.6.1 Present ICAO text for airfield configuration:

- Taxiways should be provided to permit the safe and expeditious surface movement of aircraft
- Sufficient entrance and exit taxiways for a runway should be provided to expedite the movements of aeroplanes to and from the runway and provision of rapid exit
- Taxiways considered when traffic volumes are high.
- The taxiway system should be designed to minimize restriction to aircraft movements to and from the runways and apron areas; a properly designed system should be capable of maintaining a smooth, continuous flow of aircraft ground traffic.

- Taxiway crossings of runways and other taxiways should be avoided whenever possible in the interests of safety and to reduce the potential for significant taxiing delays.

1.5.7 Capacity enhancing procedures: Two conclusions

- As traffic volume increases, runway incursion potential increases more rapidly when capacity- enhancing procedures are in effect than when they are not
- If traffic remains the same, the potential for runway incursions increases when capacity- enhancing procedures are put into operation
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- 1.5.7 Human Factors: Runway incursions are usually failures to understand
 - ▶ Where the plane is
 - ▶ Where the runway or taxiway is
 - ▶ Where a vehicle is
 - ▶ Where the animals are (Coyote, Elk, Camel, Cow etc)
- Classically seen as failures of Situation Awareness
- Failures involve three different organisations
 - ▶ Airlines - Pilots
 - ▶ ATC providers -Air traffic controllers (arrivals, departures and ground)
 - ▶ Airports - Airside vehicle staff etc.

1.6 DEFICIENCIES WHICH CAUSE RUNWAY INCURSIONS

- Lack of awareness of airport staff (Persons, Vehicles)
- Lack of security fence (Wildlife, Persons, Vehicles)
- Inadequate Airfield Visual Aids (Markings, lights, signs)
- Inadequate Aerodrome data & charts
 - Especially new developments & extensions
- Communication Pilot/ATC
 - Procedures -
 - Phraseology (non adherence to standard Phraseology)
 - Language proficiency
 - Training
 - Frequency congestion
 - similar call sign confusion
 - Inadequate Coordination (ATS / Ground Control)
- Design faults - Annex 14, Vol. I SARPS not implemented fully
 - Runway and road holding positions
 - Taxiway holding positions
 - Runway/taxiway Clearances
 - Strip grading and condition
- Lack of adequate maintenance
 - Unusable sections of the aerodrome , Drainage
 - Faulty signs or lights

1.7 PREVENTION MEASURES

- Compliance with Annex 14 Volume I SARPS
- Aerodrome Certification
- Safety Management System
- Safety Oversight
- Personnel Training
- Up-to-date AIP
- Review of Aerodrome Charts
- Institutional Factors
- Runway Incursion Detection: in good visibility, diligent visual scans by pilots and controllers are the best detectors. Occasionally, incursions can also be detected by listening to the communication channels. Three other issues directly affect timely detection of incursions1) limited visibility due to fog or darkness, (2) radio congestion and (3) airport layout complexity

Chapter 2

RUNWAY SAFETY TEAM

2.1 Introduction

- A Runway Safety Team should be established to lead action on local runway safety issues.
- The establishment of the Local Runway Safety Teams, which may comprise of representatives from Aircraft Operators, Pilot Associations, ANSPs and the Aerodrome Operator, is intended to facilitate effective local implementation of the recommendations.

2.2 Composition

The team should consist of representatives from the three main groups associated with maneuvering area operations. The Aerodrome Management (which would include a vehicle driver representative), Air Traffic Controller representation from the Air Navigation Service Provider and Pilot representation from Aircraft Operators / local pilot associations which operate at the Aerodrome.

2.3 Role

The role of the Local Runway Safety Team should be to advise the appropriate Management (in a broad sense) on potential runway safety issues and to recommend mitigating measures.

2.4 Terms of Reference

- a) Increasing the awareness of runway incursion
- b) Developing mitigation strategies for proposal to their respective management
- c) Identify any local problem issues and making suggestion for improvement that are considered necessary
- d) Running a local runway safety awareness campaign that focuses on local issues (as example: by producing and distributing local hot spot maps or other guidance material as considered necessary)
- e) Working as a combined team to better understanding the operating difficulties of those working in other areas, and suggest items for improvement
- f) Coordinating the implementation of the recommendation that have been assigned to the local teams in the runway safety document on behalf of the organization or teams they represent
- g) Considering the outcome of investigation reports to identify local hot spots or problem areas at aerodrome
- h) Make observations on a regular basis in different weather and light conditions to assess whether all markings and signage are adequate and understandable by all parties, and that no possible ambiguity exists.

Chapter 3 **RECOMMENDATIONS**

3.1 General principles

- a) At individual aerodromes, as designated by the National Aviation Safety Authorities, a Runway Safety Team should be established to lead action on local runway safety issues.
- b) A local runway safety awareness campaign should be initiated at each aerodrome for Air Traffic Controllers, Pilots and Drivers and other personnel who operate on or near the runway.
- c) Confirm that all infrastructure, practices and procedures relating to runway operations are in compliance with ICAO provisions.
- d) Where practicable, ensure that specific joint training and familiarization in the prevention of runway incursion is provided, to the pilots, air traffic controllers and vehicle drivers, to increase understanding of the roles and difficulties of personnel working in other areas.

3.2 Aerodrome Operator Issues

- a) Verify the implementation of Annex 14 provisions and implement maintenance programmes relating to Runway operations e.g. markings, lighting, and signage.
- b) Ensure that signs and markings are clearly visible, adequate and unambiguous in all relevant conditions.
- c) Works in progress - Ensure that information about temporary work areas is adequately disseminated and that temporary signs and markings are clearly visible, adequate and unambiguous in all relevant conditions.
- d) Assess the need for additional ICAO standards for aerodrome signage markings and lighting. Make recommendations to ICAO where appropriate.
- e) Implement safety management systems in accordance with ICAO provisions.
- f) Ensure a continued focus on runway safety in internal audit activities.
- g) Introduce a formal Driver training and assessment programme, or where already in place review against the Driver training guidelines.
- h) Introduce formal communications training and assessment for Drivers and other personnel who operate on or near the runway.
- i) Implement the standard ICAO naming conventions for taxiways.

3.3 Aircraft Operator Issues

- a) Provide training and assessment for Pilots regarding Aerodrome signage, markings and lighting.
- b) Pilots shall not cross stop bars when lining up or crossing a runway, unless contingency procedures are in force, for example to cover cases where the stop bars or controls are unserviceable.
- c) Ensure that flight deck procedures contain a requirement for explicit clearances to cross any runway. Includes non-active runways.
- d) When in receipt of line-up clearance, Flight crew must advise ATC if they will need to hold on the runway for more than 90 seconds beyond the time it would normally be expected to depart.

3.4 ANSP Issues

- a) Implement safety management systems in accordance with ICAO provisions.
- b) Survey the different methods and techniques in use to indicate to controllers that a runway is temporarily obstructed and recommend Best Practice.
- c) Whenever practical give ATC en-route clearance prior to taxi
- d) Aircraft shall not be instructed to cross red stop bars when entering or crossing a runway unless contingency measures are in force, e.g. to cover cases where the stop bars or controls are unserviceable.
- e) Ensure that ATC communication messages are not over long or complex.

- f) Ensure that ATC procedures contain a requirement for explicit clearances to cross any runway. Includes non-active runways.
- g) Identify any potential safety benefits of carrying out runway inspections in the opposite direction to runway movements and if appropriate adopt the procedure.
- h) Use standard taxi routes when practical to minimize the potential for pilot confusion, on or near the runway.
- i) Where applicable use progressive taxi instructions to reduce pilot workload and the potential for confusion.
- j) Avoid infringing sight lines from the tower and assess visibility restrictions from the tower, which have a potential impact on the ability to see the runway, and disseminate this information as appropriate.
- k) Recommend improvement when possible and develop appropriate procedures.
- l) Ensure that runway safety issues are included in training and briefing for ATC staff.
- m) Identify any potential hazards of runway capacity enhancing procedures when used individually or in combination and if necessary develop appropriate mitigation strategies. (Intersection departures, multiple line up, conditional clearances etc.)
- n) Do not issue line up clearance to an aircraft if this aircraft will be required to hold on the runway for more than 90 seconds beyond the time it would normally be expected to depart.
- o) When using multiple line-ups, do not use oblique or angled taxiways that limit the ability of the Flight crew to see the runway threshold.
- p) Significant aerodrome information which may affect operations on or near the runway should be provided to pilots 'real-time' using radio communication.
- q) Verify that the collection, provision and dissemination of the content of aeronautical information are in accordance with ICAO provisions.

3.5 Regulatory Issues

- a) Confirm that all infrastructure, practices and procedures relating to runway operations are in compliance with ICAO provisions.
- b) Make the appropriate regulations available to ensure implementation of safety management systems in accordance with the applicable standards.
- c) Ensure that safety assurance documentation for operational systems (new and modified) demonstrates compliance with regulatory and safety management system requirements.
- d) National Aviation Safety Authorities should focus on runway safety in their inspection activities.
- e) Certify aerodromes according to ICAO provisions, Annex 14.