

Identifying Aerodrome Hazards, Risk Assessment, and Risk Management

Sofema Online (SOL) www.sofemaonline.com considers the key elements related to Risk Assessment and Management within an EASA Aerodrome Environment.

Introduction

Hazard identification, risk assessment, and risk management are critical processes for ensuring aerodrome safety. By systematically identifying hazards, assessing associated risks, and managing those risks through effective control measures, aerodromes can mitigate potential threats and ensure the safety of passengers, aircraft, and staff.

Following best practices, such as fostering a proactive safety culture, continuously monitoring risks, and ensuring all personnel are trained and engaged, is essential to the success of an SMS.

In the context of aerodrome safety, effective hazard identification, risk assessment, and risk management are key components of a robust Safety Management System (SMS).

- These processes are designed to systematically identify potential hazards, assess the associated risks, and implement strategies to mitigate or eliminate those risks.
- This cycle is crucial to ensuring safe operations at aerodromes, and it aligns with both EASA and ICAO requirements for aerodrome operators.

Identifying Aerodrome Hazards

Hazards are any conditions, objects, or activities with the potential to cause harm, including accidents or incidents. At an aerodrome, hazards can arise from a wide range of operational areas, such as airside operations, ground handling, construction activities, environmental factors, or even third-party services (e.g., fuel suppliers, catering).

Types of Hazards in an Aerodrome Context

- **Operational Hazards**
 - Aircraft Movement Areas: Hazards arising from the operation of aircraft on runways, taxiways, and aprons. These can include surface damage, Foreign Object Debris (FOD), improper markings, and wildlife hazards.
 - Ground Vehicle Operations: Vehicles operating on the airside may pose a risk to aircraft and other vehicles. Unauthorized access, improper vehicle maintenance, and human error can contribute to this risk.
 - Runway Incursions: Incidents where unauthorized vehicles, personnel, or aircraft enter an active runway area, posing significant collision risks.

- Passenger Handling: Safety concerns related to passenger movements in and around aircraft, including issues such as jet blast, slips, and falls.
- **Environmental Hazards**
 - Weather Conditions: Adverse weather such as fog, heavy rain, snow, and crosswinds can impair aircraft operations, reduce visibility, or lead to surface contamination.
 - Bird and Wildlife Strikes: Wildlife, particularly birds, pose significant risks to aircraft operations. Effective wildlife management is essential to minimize this hazard.
 - Lighting and Visual Aids: Inadequate lighting or malfunctioning visual aids (e.g., runway lights, PAPI lights) can lead to misjudgment by pilots during takeoff, landing, and taxiing.
- **Technical and Mechanical Hazards**
 - Equipment Failures: Failures of ground support equipment (e.g., tugs, refueling vehicles) or aerodrome infrastructure (e.g., lighting systems, communications systems) can pose significant hazards.
 - Infrastructural Integrity: Cracks or damage to runways, taxiways, and aprons may create hazardous conditions, especially for landing and takeoff.
- **Human Factors**
 - Fatigue and Distraction: Human error is one of the leading causes of accidents in aviation. Fatigue, distractions, and improper training are common contributors to such hazards.
 - Non-Compliance with Procedures: Poor adherence to standard operating procedures (SOPs), whether due to negligence, oversight, or lack of awareness, is a key source of operational hazards.

Best Practices in Hazard Identification

- **Structured Hazard Identification Programs:** Use structured programs such as hazard reporting systems, safety audits, and inspections to continuously identify hazards.
- **Proactive Reporting Culture:** Foster a "just culture" that encourages all staff, contractors, and stakeholders to report hazards without fear of punishment.
- **Regular Audits and Inspections:** Implement regular inspections and safety audits of both airside and landside operations to catch hazards early.

- Data from Occurrences: Analyze past safety incidents, accidents, and near misses to identify patterns and recurring hazards.
- Engage Stakeholders: Include all relevant parties (air traffic control, airlines, ground services, emergency response) in hazard identification exercises, since different stakeholders will have unique insights.

Safety Risk Management (SRM)

- Definition: This involves identifying hazards, assessing risks, and implementing mitigation strategies.
 - Best Practices:
 - Establish a formal process for hazard identification and risk assessment.
 - Use data-driven approaches, such as incident reports, safety audits, and real-time monitoring, to identify and analyze hazards.
 - Implement a risk-based decision-making framework for operational and design changes.
 - Ensure continuous monitoring of safety performance indicators to evaluate risk controls' effectiveness.
 - Challenges:
 - Identifying potential hazards in dynamic aerodrome environments.
 - Ensuring staff report safety concerns without fear of reprisal (maintaining a "just culture").
 - Managing high volumes of safety data and drawing actionable insights from them.

Risk Assessment in Aerodrome Operations

Risk assessment is the process of evaluating the likelihood and severity of a hazard leading to an undesirable event, such as an accident or incident. Once hazards are identified, aerodrome operators must assess the associated risks and prioritize mitigation efforts.

Steps in Risk Assessment

Hazard Identification: As discussed, the first step is identifying hazards that could affect safety.

Risk Analysis: Once hazards are identified, analyze the risk in terms of:

- **Likelihood (Probability):** The frequency with which a particular hazard is likely to lead to an incident or accident. Likelihood can be estimated based on historical data or expert judgment.
- **Severity (Impact):** The potential consequences if the hazard results in an incident. Severity ranges from minor damage or injuries to catastrophic outcomes such as loss of life or significant aircraft damage.
- **Risk Evaluation:** Combine the likelihood and severity to determine the overall risk level. Risks can be classified into categories such as:
 - **High Risk:** Unacceptable, requiring immediate action or complete cessation of activities until mitigations are in place.
 - **Medium Risk:** Acceptable with conditions, requiring prompt implementation of mitigation measures.
 - **Low Risk:** Acceptable, with regular monitoring to ensure it remains low.

Best Practices for Risk Assessment

- **Comprehensive Data Collection:** Utilize historical data, safety reports, audits, and employee feedback to inform risk assessments.
- **Engage Multiple Stakeholders:** Risk assessments should involve input from diverse areas of aerodrome operations, including ground handlers, airlines, air traffic control, and regulatory bodies.
- **Review and Update:** Regularly review and update risk assessments, particularly when there are changes to operations, infrastructure, or regulations.
- **Predictive Risk Management Tools:** Use advanced data analytics and safety performance indicators (SPIs) to predict potential risks and take action before incidents occur.

Risk Management in Aerodrome Operations

Risk management refers to the process of implementing controls to mitigate or eliminate identified risks. In the context of an aerodrome SMS, risk management is about proactively controlling and monitoring risks to ensure they do not compromise safety.

Risk Management Strategies

- **Risk Elimination:** Completely removing the source of risk, when feasible. For example, restricting access to certain areas of the aerodrome where hazards are present.
- **Risk Mitigation:** Reducing the likelihood or severity of a risk. This might involve introducing safety barriers, new technologies, or revising procedures. For example:

- Installing wildlife deterrents to minimize bird strikes.
- Improving runway surface conditions to reduce the risk of aircraft damage.
- **Risk Transfer:** Passing the risk to a third party, typically through insurance or contractual agreements. For example, an aerodrome might transfer financial risk through liability insurance.
- **Risk Acceptance:** Some risks, particularly low-probability, low-severity risks, may be accepted. These risks should be continuously monitored to ensure they remain within acceptable thresholds.

Best Practices for Risk Management

- **Implementing Control Measures:** Ensure that mitigation measures are implemented and that responsibilities for implementation are clearly assigned. For example:
 - Physical barriers to prevent runway incursions.
 - Safety management software to track and report hazards in real time.
 - Training programs for staff to handle specific hazards.
- **Monitoring and Reviewing Controls:** Continuously monitor the effectiveness of risk controls. Risk management is not a one-time event but an ongoing process that must be regularly reviewed, especially after incidents or operational changes.
- **Documentation:** Ensure all risk management actions are properly documented, from the identification of hazards to the measures taken to mitigate them. Documentation should be maintained in a way that allows for continuous review and regulatory compliance.
- **Training and Safety Culture:** Train staff to recognize hazards, report them, and understand their role in mitigating risks. Building a safety culture where risk management is an integral part of daily operations is critical.

Challenges in Risk Management

- **Dynamic Operating Environment:** Aerodromes operate in highly dynamic environments, making it difficult to foresee every possible hazard.
- **Human Factors:** Ensuring all staff remain vigilant, even in routine operations, is a challenge in managing human error.
- **Resource Constraints:** Small or regional aerodromes may struggle to allocate the necessary resources for comprehensive risk management.

Next Steps

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