SOFEMA
AVIATION SERVICES

Performing Hazard Identification and Risk Management

Sofema Aviation Services (SAS) www.sassofia.com considers practical engagement techniques related to Safety Management System Hazard Identification & Risk Management.

Introduction

Performing hazard identification and risk management in aviation safety management systems (SMS) is a crucial process to ensure the safety and efficiency of aviation operations.

Hazard Identification Definitions

ICAO Definition - The term hazard is defined in the ICAO Safety Management Manual (SMM) (Doc 9859) as: A condition or 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.

General Definition: Hazard identification involves recognizing and documenting potential sources of harm or adverse conditions that could affect safety in aviation operations.

Definition of Procedural Hazards - Procedural hazards arise from inadequate or incorrect procedures that can lead to unsafe conditions or actions. These hazards often result from a lack of clarity, training, or adherence to established procedures.

Definition of Workplace Hazards - Workplace hazards are potential sources of harm or adverse effects on workers' health and safety. These hazards can arise from various factors, including physical exposure, poor procedures, and environmental conditions.

Best Practices for Hazard Identification

- **Systematic Approach:** Use a structured method to identify hazards, such as checklists, surveys, safety audits, and brainstorming sessions.
- **Engage Personnel:** Involve a diverse group of stakeholders, including pilots, maintenance crews, air traffic controllers, and ground staff, to gather a wide range of insights and experiences.
- **Data Collection and Analysis:** Collect data from various sources such as incident reports, flight data monitoring, maintenance logs, and safety reports. Use data analytics to identify trends and recurring issues.

- **Regular Reviews:** Conduct regular reviews and updates of hazard identification processes to adapt to new information, changes in operations, or regulatory requirements.
- **Use of Technology:** Implement advanced tools and software for hazard identification, such as Safety Management Software (SMS), which can facilitate data collection, analysis, and reporting.
- **Training and Awareness:** Provide ongoing training and awareness programs to ensure all personnel are knowledgeable about hazard identification procedures and the importance of reporting hazards.

Examples of Hazards:

Physical Hazards

- Slip, Trip, and Fall Hazards:
- Wet or oily floors.
- Uneven walking surfaces or loose flooring.
- Cables or hoses running across walkways.
- Poorly lit areas.

Ergonomic Hazards

- Poorly designed workstations leading to repetitive strain injuries.
- Manual handling of heavy loads without proper equipment.
- Prolonged awkward postures or movements.

Mechanical Hazards

- Moving machinery parts without adequate guarding.
- Sharp edges or cutting tools.
- Pressurized equipment and pipelines.

Chemical Hazards

- Exposure to hazardous substances like cleaning agents, aviation fuel, or de-icing chemicals.
- Improper storage or labeling of chemicals.
- Lack of ventilation in areas where chemicals are used.

Noise Hazards

- Exposure to high noise levels from aircraft engines, ground support equipment, or machinery.
- Lack of hearing protection in high-noise areas.

Environmental Hazards

- Natural Disasters:

- Earthquakes affecting airport infrastructure.
- Flooding due to heavy rains or storm surges.

Wildlife

- Presence of wildlife near runways leading to potential collisions.
- Insects that can cause contamination or damage to equipment.

Climate-Related Hazards

- Extreme temperatures impacting both equipment and personnel.
- Icing conditions affecting aircraft surfaces and runways.

Procedural Hazards

- Operational Errors:
- Incorrect operation of equipment due to inadequate procedures.
- Failure to follow standard operating procedures (SOPs) during critical tasks.

Documentation Issues

- Outdated or missing maintenance records.
- Incomplete or incorrect flight logs.

Emergency Procedures

- Lack of clear, practiced emergency evacuation plans.
- Inadequate procedures for handling in-flight medical emergencies.

Human Factors Hazards

- Fatigue - Long working hours without adequate rest
- Irregular shift patterns affecting sleep cycles.
- Distraction - Use of mobile phones or personal devices while performing safety-critical tasks.
- External distractions like noise or environmental conditions.
- Stress - High-pressure work environment leading to cognitive overload.
- Personal issues affecting focus and performance.

Training Deficiencies

- Insufficient training on new equipment or procedures.
- Lack of refresher training for long-term employees.

Communication Issues:

- Miscommunication between crew members or between ground and flight crews.
- Language barriers among multinational teams.

Best Practices for Hazard Identification - Systematic Approach:

- Checklists: Develop and use comprehensive checklists tailored to specific areas of operation, such as pre-flight checks, maintenance procedures, and ground operations.
- Surveys: Conduct regular surveys among staff to identify potential hazards and gather feedback on existing safety measures.
- Safety Audits: Perform periodic safety audits to systematically inspect all aspects of operations and identify potential hazards.
- Brainstorming Sessions: Organize brainstorming sessions with cross-functional teams to discuss potential hazards and share diverse perspectives.

Data Collection and Analysis:

- Incident Reports: Analyze incident and accident reports to identify common hazards and underlying causes.
- Flight Data Monitoring: Use flight data monitoring systems to collect and analyze data on flight operations, looking for anomalies or trends that indicate potential hazards.
- Maintenance Logs: Review maintenance logs to identify patterns of equipment failure or recurring issues that may indicate a hazard.
- Safety Reports: Utilize safety reports and safety management databases to collect and analyze data on near-misses, unsafe conditions, and other safety-related incidents.
- Periodic Reviews: Schedule regular reviews of hazard identification processes, adjusting methodologies and tools based on new information and changing operational environments.
- Update hazard identification practices to reflect changes in technology, regulations, and operational procedures.
- Implement a continuous improvement cycle where feedback and review results are used to enhance hazard identification efforts.

Training and Awareness:

- Conduct regular training sessions on hazard identification techniques, risk assessment, and reporting procedures.
- Develop awareness programs to educate staff on the importance of hazard identification and the role they play in maintaining safety.
- Use scenario-based training to simulate real-life situations, helping personnel recognize and respond to potential hazards.
- Incorporate feedback from hazard reports and incident investigations into training programs to ensure lessons learned are communicated to all staff.

Risk Management

Definition: Risk management involves assessing the identified hazards to determine their potential impact and likelihood, and implementing measures to mitigate or eliminate the risks.

Best Practices for Risk Management

- **Identify Hazards:** Through safety audits and incident reports, identify a potential hazard such as foreign object debris (FOD) on runways.
- **Assess Risks:** Use a risk matrix to evaluate the likelihood (e.g., occasional) and severity (e.g., major) of an aircraft being damaged by FOD.
- **Prioritize:** Categorize the risk as high based on the assessment.
- **Mitigation:** Implement regular runway inspections, install FOD detection systems, and provide training for ground personnel on FOD management.
- **Monitor:** Continuously monitor runway conditions, review incident reports related to FOD, and adjust mitigation strategies as needed.
- **Review:** Periodically review the effectiveness of the FOD management program and make improvements based on feedback and data analysis.

Risk Assessment: Evaluate the risk associated with each identified hazard using a risk matrix that considers the severity of consequences and the likelihood of occurrence. This can be qualitative or quantitative.

- **Severity:** Assess the potential impact of the hazard (e.g., catastrophic, major, minor).
- **Likelihood:** Determine the probability of the hazard occurring (e.g., frequent, occasional, remote).

Prioritization: Prioritize risks based on their assessed level to focus on the most critical areas. Use a risk matrix to categorize risks into high, medium, and low levels.

Mitigation Strategies:

- **Avoidance:** Change plans or procedures to eliminate the hazard.
- **Reduction:** Implement measures to reduce the likelihood or severity of the hazard.
- **Segregation:** Separate the hazard from potential targets to minimize risk.
- **Acceptance:** Accept the risk if it is within acceptable levels and cannot be further mitigated cost-effectively.

- **Implement Controls:** Develop and implement safety controls or corrective actions to mitigate identified risks. These can include technical solutions, procedural changes, or additional training.

- **Monitor and Review:** Continuously monitor the effectiveness of risk mitigation measures and review the risk management process regularly. Adjust strategies as necessary based on new information or changes in the operational environment.

- **Documentation:** Maintain detailed records of all identified hazards, risk assessments, mitigation measures, and monitoring activities. This ensures transparency, facilitates audits, and supports continuous improvement.

- **Communication:** Ensure clear communication of risks and mitigation measures to all relevant stakeholders. Use safety bulletins, meetings, and briefings to keep everyone informed.

Example - Hazard Mitigation Strategies

- Implement strict housekeeping protocols to keep walkways clear and dry.
- Redesign workstations and provide ergonomic tools and equipment.
- Install guards on moving parts and provide proper training on machine operation.
- Ensure proper labeling, storage, and use of chemicals along with providing adequate ventilation.
- Enforce the use of hearing protection devices in high-noise areas.
- Develop and practice emergency response plans for natural disasters.
- Implement wildlife control measures and regular inspections.
- Use equipment designed for extreme temperatures and provide appropriate PPE for personnel.
- Regularly review and update SOPs and ensure strict compliance through training and audits.
- Implement electronic documentation systems to maintain up-to-date and accurate records.
- Conduct regular emergency drills and reviews to ensure preparedness.
- Implement fatigue risk management systems, including proper scheduling and rest periods.
- Establish policies to limit the use of personal devices during work hours.
- Provide support programs and training on stress management techniques.
- Ensure comprehensive and ongoing training programs for all employees.
- Promote a culture of clear and open communication, including regular briefings and the use of standardized communication protocols.

Summary

By engaging a wide range of personnel, leveraging advanced technology, and continuously analyzing data, aviation organizations can stay ahead of emerging risks and ensure that safety management systems (SMS) remain robust and effective. Regular training and awareness programs further strengthen these efforts, ensuring that all personnel are equipped to recognize and respond to hazards.

Risk management in aviation involves not only identifying and assessing risks but also prioritizing and implementing measures to mitigate or eliminate these risks. Continuous monitoring and regular reviews of risk management processes ensure that mitigation strategies are effective and adaptable to changes in the operational environment.

Effective communication and thorough documentation are also critical, providing transparency, facilitating audits, and supporting continuous improvement in safety practices. By adhering to these best practices, aviation organizations can uphold the highest standards of safety, protect their personnel, and ensure the smooth operation of aviation activities.

Next Steps

Sofema Aviation Services (www.sassofia.com)and Sofema Online (www.sofemaonline.com) provide Safety Management System classroom, webinar and online training. For details please see the respective website or email team@sassofia.com