

Hazard identification in aviation engineering essay

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Introduction:

The aim is to avoid risk of hazard anything with the potential to cause harm in any condition, event, or circumstance which could induce an accident. A hazard is any existing or potential condition that can lead to injury, illness, or death to people; damage to or loss of a system, equipment, or property; or damage to the environment. A hazard is a condition that is a prerequisite to an accident or incident. The fundamental is to understand Hazards, Identify the hazard, Analyses the hazard. Hazard is the potential cause of harm in any condition. Hazard
Accident
cause of illness or death of person
damage of equipment and systems
It consist of safety assessment process in the Design and Certification process identifies and classifies most of the hazards, assesses the risks, and introduces controls - this is a good starting point for identifying the hazards to the operation and there should ideally be a clear link between design and certification and operations. The basic hazard identification or made by ICAO to avoid future Hazards. The implementation of operation in safety management system by aircraft operators and aviation service providers within the organizational framework of the SMS, operators/service providers " shall develop and maintain a formal process for effectively collecting, recording, acting on and generating feedback about <https://assignbuster.com/hazard-identification-in-aviation-engineering-essay/>

hazards in operations, based on a combination of reactive, proactive and predictive methods of safety data collection". The safety risk assessment following the ICAO to be performed as a everyday check to avoid the possible risk. It can also be performed on proposed changes to a system or operation to ensure that the risks from any additional hazards or any impacts on existing hazards, introduced by the change remain acceptably safe. The Hazard identification processes to avoid the future risk are given in subtopics.

Hazards:

Hazards are considered as Risk in a situation that poses a level of threat to life, health, property, or environment. $Risk = Hazard \times Vulnerability - Capacity$ Hazards identification is the act of recognizing the failure conditions or threats (Safety Events), which could lead to Undesirable Events and defining the characteristics of these undesirable events in terms of their potential Safety Outcomes and of the magnitude of these safety outcomes' Consequences.

Risk:

The combination of the predicted consequence is taken it to account for identification of hazards day by day for the potential outcome. The most used method is the " Bow-tie" method (fig. 1). As we can see the figure 1 it will explain the safety measures that can be taken and if it was not taken. The figure shows that the risk can be avoided by placing some barriers or rules in order to maintain safety.

Risk Control:

The risk control is use to make a system or action that reduced in risk associated with hazard. Mitigation is used to screen the risk to eliminate the hazard and Barrier is set to reduce the frequency of hazard. As we see the diagram given below fig(1) refers how the structure works to prevent the hazard. The method is a set of logical question in a sequence it makes to understand the hazards as understandable event and safety and potential out come as the risk is controlled to minimum hazard. The work of risk management is to control the potential risk. This can be achieved by barriers it is controlled by any measure taken that act against some undesirable force or intention, in order to maintain a desired state. This method is preventive or proactive methods that prevent the Undesirable Event from happening. There are also corrective or reactive controls that prevent the Undesirable Event from resulting into unwanted Outcomes or reduce the consequence severity of the Outcomes. An example of Aircraft icing is given in the table that represents the method involved to prevent a hazard. C: Documents and SettingsAdministratorDesktopAMM Intermidate projectow-tie diagram. JPGFigure 1: Bow-tie diagram

Aircraft icing**Safety event****Safety barrier****Undesirable event****mitigation****Potential outcome****Consequence severity**

Failure of anti/di-icing system Aircraft anti/di-icing system design Accretion of ice on airframe or engine System failure warning Aircraft mush/stall Multiple fatalities/loss of aircraft Failure of ice detection system Outside temperature indicator Ice accretion warning Reduce aircraft performance Significant repair and off line service cost Failure of crew to detect ice on the aircraft Maintenance procedures Pilot training for cold weather operations Engine flameout Aircraft diversion Pre-Flight check Pilot training Example for bow-tie diagram

Hazard identification:

Reactive proactive Driven Qualitative Reactive identification method the hazard is recognized by monitoring and investigation of safety occurrences. The hazard is indicated to the system to avoid the hazard. Proactive identification method the hazard is identified analyzing systems performance and functions for intrinsic threats and potential failures. The method consists of safety surveys, operational safety audits, and safety monitoring and safety assessments. Driven method the data was saved and the future process which allows analyzing the saved data for tracing the hazard like Hazard

report, Flight Data monitoring (FDM) and staff surveys. Investigation of the past hazard for finds the existing hazard. By this method the system will find the other hazard at present the equipment has. Qualitative method the information was formed by the base of discussion, Interviews or Brainstorming. This process is based on an expert judgment they often identify the hazard that other approach can't detect. Using the every approach combined will provide a more accurate result to finding hazard. EASA has recently published an opinion on Operational Suitability Data that addresses the issue of the link between certification and operation. Hazards identification performed at the operations stage should ideally refer to Design and Certification, where hazards were first considered and risks assessed and mitigated. In practice, this link is seldom done and should therefore be encouraged.

Hazard in Aviation:

1) Hazard/Risk Management Process in Aviation:

Hazard in aviation is very high and the identification is the complex processes in this situation. It depends on the ICAO Doc 9859 Safety Management Manual we know the common hazard in Aviation. The following flow chart will provide the steps to avoid hazard and controlling risk in a system.

SCOPE OF ACTIVITY
MANAGEMENT OF CHANGE PROCESS
PROCESS
NEW HAZARDS
IDENTIFY AND RECORD HAZARDS
SAFETY REPORTING &
INVESTIGATION PROCESS LINKED DIRECTLY TO THE SAFETY CASE. RISK
ANALYSIS
IDENTIFY CONTROLS FOR SPECIFIC HAZARDS
VALIDATE EXISTING
CONTROLS OR DEVELOP NEW CONTROLS
NEW CONTROL REQD
CONTROL
EXISTSSAFETY REPORTING & INVESTIGATION
REMEDIAL ACTION

PLAN REFERENCE CONTROLS AND RESPONSIBLE POSTS INTERNAL AUDIT TO CONFIRM IMPLEMENTATION & EFFECTIVENESS OF CONTROLS CONTROL DEVELOPED QA SYSTEM - UPDATE CHECKLISTS MANAGEMENT REVIEW

The flow chart characterizes every step that can be control or avoid the hazard in an organization. It was explained below as steps. Step 1: The scope is to avoid hazard by determining the range of aircraft the process will cover. It can be small or large, small operations can cover the whole operation by one group. Large operation need to split the operation to several groups. By starting the point where the greatest hazard or risks can occur. Step 2: Identify & Record Hazards Definition of a Hazard can cause debate amongst learned safety professionals. It was categorized by two Generic and specific hazard. Generic Hazard can be wind or the aircraft component. Specific hazard can be crosswind above the normal limit or damaged aircraft component. This stage is a continuous process. It can be done by the method given below.

Brainstorming Safety report Accidental report and flight data monitoring Trend analyses This information should be recorded in the Hazard registry in various forms. An record registry example is given in the figure(2) give below.

Hazard register:

Task description/ location

Ref: NO

Date last reviewed

RAM source

Initial Current

Control

Reference

Owner

Status

Figure (2) Step: 3 Risk Analysis identified hazards assess the level of risk if further action is required and where effort needs to be directed first. This can be done by using the risk assessment matrix "RAM" to get the objective risk and its level. This enables standardization across the organization and reduces the argument and dispute by giving clear indication in the risk review for management. An example of RAM table is given as two figures. The first figure is the typical RAM diagram with color representation red is the most important and focused area.

Frequent Probable Occasional Remote Improbable Catastrophic 124812 II - Critical 3561015 III - Marginal 79111417 IV - Negligible 1316181920 Typical RAM model C: Documents and Settings Administrator Desktop AMM Intermediate project RAM. bmp Detailed RAM model Detailed definition of Likelihood. More detail can be added to consequences. Consequences should be applied as the actual consequences that happened in previous cases of the event. Step 4: Identify controls for specific hazards are fined by brainstorming, bow tie and tripod analysis. This step requires that appropriate controls are identified to manage. The higher the risk, the more effective the controls have to be and potentially more layers of controls required. These methods are referred with As Low As Reasonably Practicable (ALARP). Look at the hazard isolated from financial and resource constraints in the first place are the work of ALARP and comparing the other company for the safety procedures taken by

it. Each controls need to meet the following effective, Cost benefit, Practical, Acceptable, Enforceable and Durable. Step 5: Reference controls and responsible posts is use to limit the some work that may cause hazard and making prediction from past accidents and risk. The example of char filled in support. C: Documents and SettingsAdministratorDesktopAMM Intermidate project egistry example. JPGStep 6: Remedial Action Plan is the organizational and person of management responsible to make the decision for some issues. Ideally an organization should have just one remedial action plan, containing all the actions arising from the hazard management process, safety reporting, QA audits etc. This presents senior management with one complete overview and allows departmental requirements to be compared and addressed on a priority basis using the RAM score. For larger global organizations, local plans may be required. Remedial actions plans can be recorded on simple excel sheets or in complex integrated databases such as Qpulse or Impact Safety. The Hazard Register should reflect the status of the remedial action plan. Having completed and referenced the RAP, the current risk score for that hazard can be re-assessed, taking into account the mitigations and controls that the company has in place. Step 7: Interface with quality assurance system. The management need to explain the plans and implementation to the quality assurance system. Having documented controls to manage hazards, some existing and some new, QA checklists must be updated to ensure that auditors assess those controls for compliance and effectiveness. If the process is not satisfied the proses should send to step 4 again to review and make some changes to it and other steps should be repeated if necessary." These seven steps are the common and most used proses so far but the proses need to be more

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effective and more active. To make it active the following steps are used."

Step 8: Making connection with identifying record and identification controls

for make safety reporting & investigation. All company

accident/incident/hazard/near miss report forms should have a step that

requires the safety manager or investigator to refer to the hazard register as

part of the investigation process. If a new hazard is identified this should

lead to Step 2. If the hazard has already been analyzed and documented, the

process should result in the existing controls being reviewed for

effectiveness. Step 9: Management of changes: The management reviews

the proses by the safety protocol of ICOA it was done by checking the report

or registry of hazard and formulation the precaution for the future hazard.

The same process could be applied to a new contract or operation and the

MOC Summary could be presented to the client prior to the start of

operations as part of their assurance that all hazards have been assessed

and that risk is being managed to ALARP. Scope of changeRef no:

Accountable ManagerType of changePermanentTemporary: From

_____ to _____ Department/locationResponsibleHazard

Register Reviewed/UpdatedSignatureSummary of Actions

ArisingResponsibleDueDate & SignatureStatement of

Completion/FitnessAccountable ManagerDate & SignatureDocument for

Management of changesStep 10: Management Review: In this step the

management has to review and accept the proses. It is also duty to look

after the quality assurance, remedial action plan and safety reporting and

investigation by reviewing all the proses taken by this decision.

2) Scope of Hazard:

The scope of hazards existing in aviation operation environment is very wide. That is why hazard identification is a complex process as it considers extensive range of possible sources of failure. Depending on the nature and size of the organization, its operational scope and environment there are different factors to consider during hazard identification. The following factors listed in ICAO Doc 9859 Safety Management Manual are examples of common hazard. Design factors, including equipment and task design; Procedures and operating practices, including their documentation and checklists, and their validation under actual operating conditions; Communications, including the medium, terminology and language; Personnel factors, such as company policies for recruitment, training and remuneration; Organizational factors, such as the compatibility of production and safety goals, the allocation of resources, operating pressures and the corporate safety culture. Work environment factors, such as ambient noise and vibration, temperature, lighting and the availability of protective equipment and clothing; Regulatory oversight factors, including the applicability and enforceability of regulations; the certification of equipment, personnel and procedures; and the adequacy of surveillance audits; and Defences, including such factors as the provision of adequate detection and warning systems, the error tolerance of equipment and the extent to which the equipment is hardened against failures.

Conclusion:

The Aviation Industries and other originations are working to find possible methods to avoid hazard to the worker, equipment's and the customers. As

we can see the possible methods to prevent and avoid the hazard is effective yet one need to maintain his or her role to prevent the hazard. In future Aviation hazard can possible avoid by using all methods mention above. Use a single method is not an effective way.