МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ

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Аерокосмічний факультет

Кафедра підтримання льотної придатності повітряних суден

ДОПУСТИТИ ДО ЗАХИСТУ

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КВАЛІФІКАЦІЙНА РОБОТА

(ПОЯСНЮВАЛЬНА ЗАПИСКА)

ВИПУСКНИКА ОСВІТНЬО-КВАЛІФІКАЦІЙНОГО РІВНЯ **«МАГІСТР»**

Тема: «*Удосконалення системи льотної придатності гелікоптерів типу Мі-8 на основі ідентифікації загроз і управління ризиками при технічному обслуговуванні»*

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Київ 2021

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

NATIONAL AVIATION UNIVERSITY

Aerospace faculty

Aircraft Airworthiness Continuing Department

PERMISSION TO DEFEND

The Head of the department

Candidate of science (Engineering), Assoc. prof

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"____"_______________ 2021

MASTER DEGREE THESIS

(EXPLANATORY NOTE)

Topic: *"Improvement of airworthiness retaining system of Mi-8 helicopter family based on threat identification and risks management at maintenance"*

Fulfilled by:	__________	Kucherenko N.V.
Supervisor: Candidate of science (Engineering), assoc. prof.	__________	Maksymov V.O.
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Kyiv 2021

NATIONAL AVIATION UNIVERSITY

Faculty: *The Aerospace Faculty*

Aircraft Continuing Airworthiness Department

Educational and Qualifications degree: *Master*

The specialty: 272 «Aviation transport»

Educational-professional program «Maintenance and Repair of Aircraft and Engines»

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Graduation Project Assignment

Student’s name: Kucherenko Nikita Victorovich

1. The Work (Thesis) topic: «*Improvement of airworthiness retaining system of Mi-8 helicopter family based on threat identification and risks management at maintenance* »

approved by the Rector’s order of December 14, 2017 №594/од.

2. The Graduation Project to be performed: *October 25-2021—December 12-2021.*

3. Initial data for the project: *Development of the proposals for the improvement of airworthiness retaining system of Mi-8 helicopter family based on threat identification and risks management at maintenance.*
4. The content of the explanatory note (the list of problems to be considered): *Improvement of airworthiness retaining system of Mi-8 helicopter family based on threat identification and risks management at maintenance.*

5. The list of mandatory graphic materials: *(posters): research methodology; safety managment system; risk assessment and hazard identification; safety policy, assurance, promotion; reliability of Boeing family; risk assesment; flight safety; aircraft airworthiness; aviation safety reporting system; audit system; flight safety integrated managment system; target indicators of European companies.*

6. Time and Work Schedule

Stages of Graduation Project Completion	Stages Completion Dates	Remarks
Literary review of materials in the scientific direction of the thesis	06.10.20-12.10. 21	Done
ICAO Approach to the Risks Management	13.10.20-19.10.21	Done
Mi-8 Family Reliability	20.10.20-26.10.21	Done

ICAO Approach to Hazard Identification and Risk Assessment	27.10.20-06.11.21	Done
Target Indicators	07.11.20-18.11.21	Done
Maintenance Organization Staff Optimization	19.11.20-29.11.21	Done
Labor precaution	30.11.20-03.12.21	Done
Environmental protection	03.12.20-05.12.21	Done

7. Advisers on individual sections of the work (Thesis):

Section	Adviser	Date, Signature	
		Assignment Delivered	Assignment Accepted
Labour precaution	Kovalenko V.V.		
Environmental protection	Saenko T.V.		

8. Assignment issue date ______________________

Graduate Project Supervisor MAKSYMOV V.O. (supervisor signature)____________________

Assignment is accepted for performing:

Graduate student KUCHERENKO N.V. (graduate student's signature) (Date)_______________

ABSTRACT

Explanatory note to the diploma work “Improvement of airworthiness retaining system of Mi-8 helicopter family based on threat identification and risks management at maintenance”:

… pages, … figures, and …tables … references

Main key words: risk assessment and hazard identification; safety managment system; safety policy, assurance, promotion; risk assesment; flight safety; aircraft airworthiness; aviation safety reporting system; audit system;

Research subject: Development of the proposals for the improvement of airworthiness retaining system of Mi-8 family based on threat identification and risks management at maintenance.

LIST OF CONVENTIONAL ABBREVIATIONS, DESIGNATIONS, SYMBOLS

This is a list of abbreviations and designations which are used in text.

ICAO – International Civil Aviation Organization

SMM - Safety Management Manual

ERP - Emergency Response Plan

SMS - Safety Management System

SRM - Safety Risk Management

SMI - Safety Management Implementation

SSP - State Safety Programmes

ECAST - European Commercial Aviation Safety Team

EASA - European Aviation Safety Agency

SARP - Standard and Recommended Practice

ATC - Aircraft Type Certificate

CMR - Certificate of Maintenance Review

VIRP - Voluntary Incident Reporting Program

ASAP - Aviation Safety Action Program

IATA - International Air Transport Association

IACA - International Air Carriers Association

ERAA - European Regions Airlines Association

USOAP - Universal Safety Oversight Audit Programme

SAR - Service Arrangement Regulation

FSIMS - Flight Safety Integrated Management System

TAWS - Terrain Avoidance and Warning System

ACAS - Airborne Collision Avoidance System

INTRODUCTION

Identification of threats and risk management are fundamental for security, and safety. Foundation and roof of all aviation. Flight safety risks is the most basic question and this is exactly what each airline is committed to reduce. Despite the fact of that aviation and many incidents cannot be excluded of aviation, since everywhere there is a human factor,

Risks and threats can be monitored and predicted. If we neglect the safety of flights in the airline, Than the demand for aviation movement will fall, which at the same time is simply unreal, people just got used to the plane.

ICAO ACCESS TO THE RISKS MANAGEMENT

1.1 ICAO Access to the Safety Managment Systems

There are four SMS components that show two main operational process, which are based on SMS, as well as organizational agreements - which are necessary to support two main operating proposals. Four components SMS are:

- safety policy and objectives;
- safety risk management;
- safety assurance;
- safety promotion.

SMS provide:

- A systematic way to identify and control risks.
- Assurance that risk controls remain effective.
- A formal means of meeting Statutory requirements.
- For the CAA a mean for evaluating an organization's Safety Management Capability.

1.2 Safety Management System

(SMS) is a systematic approach to security management, which involves the necessary organizational structure, access, policies and procedures. This is a permanent and explicit approach that determines activities through which security management is carried out by the organization to achieve admissible or tolerable security.

SMS is often known as a list of operations and devices for managing a structural safety program.

SMS is not just a subject for thought at present. SMS has already started his life in the past. Before that day, people began to fly, and the development of aviation in the future to attract the fact that with attentive age there will be a lot of attention to security. Many aviation service providers have operations to worsen the risk of permissible level. In fact, each SMS operator. However, when we talk about SMS, usually called SMS, we mean safety management processes. Currently, operators do not fly without SMS aircraft standards and recommendations are based on ICAO.

The purpose of the Safety Management system is the indication of the structured management approach to control the risk of safety in operations. Effective security management should take into account specific structures and processes of organizations related to the safety of operations.

1.2.2.1 Hazard Identification Hazard identification

Identification of unnecessary or antagonistic cases that may accompany the danger event and inspection of devices, with which these cases may occur, and causes a threat. Both reactive and proactive strategies and methods should be used to identify the risk . Hazard identification is part of the process used to evaluate if any particular situation, item, thing, etc. may have the potential to cause harm. The term often used to describe the full process is risk assessment:

- Identify hazards and risk factors that have the potential to cause harm (hazard identification).
- Analyze and evaluate the risk associated with that hazard (risk analysis, and risk evaluation).
- Determine appropriate ways to eliminate the hazard, or control the risk when the hazard cannot be eliminated (risk control).

The main goal of hazard identification policy is to find and record likely dangers that may be present in your workplace. It can help work as a team and include as people familiar with the working area, as well as people who are not - thus you have both an experienced and fresh eye for inspection.

1.2.2.2 Risk Assessment

Risk Assessment is the second point in the risk management process. After the danger and their effects were seen during the first step using the hazard identification, it is necessary to estimate the likelihood of the impact of the danger and the validity of these effects to operate the danger.

Risk assessment - unresolved dangers are estimated from the point of view of their criticality of destructive impact and are located in organizing their risky potential. They are usually evaluated by experienced personnel or use more formal methods and thanks to analytical skills. The seriousness of the results and the probability (frequency) of hazards events is determined. In case the danger is considered satisfactory, the operation continues without any mediation. If this is not acceptable, negotiate with the probability of blocked.

1.2.2.3 Risk Mitigation

Risk mitigation - if the risk is regarded as unsatisfactory, at this point the control measures are taken to strengthen and increase the level of resistance against this danger or maintaining the strategic distance from or removing the danger if it is financially implemented.

Threat management strategies (uncertainties with negative consequences) usually include avoiding threat, reducing the negative effect or the likelihood of a threat, transmitting all or parts of the threat to the other side, and even the preservation of some or all potential or actual consequences of a certain threat. The opposite of these strategies can be adopted to respond to the possibilities (indefinite future benefits).

1.2.3 Safety Assurance description

1.2.3.1 Safety Performance Monitoring and Measurement

Monitoring and measuring safety performance ensures continuous monitoring and continuous assessment of the security levels achieved by the organization during the service. Security performance must be confirmed to security policies and approved security goals (safety efficiency objectives) using the selected security performance indicators (SPIS). Trends should be analyzed and, therefore, corrective actions must be determined after the detection of any deterioration of the safety levels shown.

Safety monitoring could be an important source of information for measuring the effective functioning of other SMS components. According to EUROCONTROL ESARR4 - Risk Assessment and Mitigation in ATM, safety monitoring and data collection mechanisms could be specifically developed and used for the validation of the safety assumptions and requirements identified in the risk assessment and mitigation processes, as well as for the validation of safety models used in risk management. Also, safety monitoring and data collection support the development of safety indicators at national, regional and global level.

The guidance material suggests the following basic steps for establishing effective safety monitoring and measurement processes:

- identification of indicators to be monitored

The scope of monitoring should cover operational, technical, and organizational (safety management) aspects. Safety indicators can be quantitative or qualitative, leading (proactive) or lagging (reactive).

- application of the corrective action process.
- collation of the information for safety monitoring

There should be systematic collation and evaluation of results from all safety monitoring activities to ensure that interrelationships can be detect.

- analysis of indicators

The evolution of the indicators should be analyze, trends and related causes and influencing factors established.

Corrective actions, taken and followed everywhere monitoring shows that the element is approaching a point that may affect security to unacceptable degree; Coordination with relevant units / organizations should take place wherever it is necessary. Indicators and their evolution must be documented as well actions are taken and their results.

1.2.3.2 Management of Change

Change of Management (MOC) is a regular approach to organizational changes to the main objective of ensuring the continuation of the safety of labor throughout the entire process. These regular processes ensure that the change is considered in active form.

The main organizational changes may come as a result of internal solutions, such as corporate drying or reduction, replacement retires senior managers or merger or acquisition from another company. They can also come as a result of external factors, such as new government rules or updated industry standards.

Regardless of the reasons for them, organizational changes can be strongly destructive for normal organization operations. Since these operations include processes, procedures and policies aimed at protecting workers from injuries devoted to changes, accidentally or without settlement, can leave workers unsafe and unprotected.

Management of changes contains the preservation of security workers by implementing a kind of temporary security program and ensuring that no worker put on an unjustified risk, while changes are located.

1.2.3.3 Continuous Improvement of SMS

To determine the causes of the subtandard characteristics of the security management system, determine the consequences of poor quality performance in operations and remove such reasons.

According to ICAO Doc 9859 - Safety Management Manual this is one of the three elements of the safety assurance component of the SMS. Assurance builds on the principle of the continuous improvement cycle. In much the same way that quality assurance facilitates continuous improvements in quality, safety assurance ensures control of safety performance, including regulatory compliance, through constant verification and improvement of the operational system and services. These objectives are achieved through the application of similar tools: internal evaluations and independent audits (both internal and external), strict document control and ongoing monitoring of safety controls and mitigation actions.

Continuous improvement is achieved through internal estimates, internal and external audits and apply to:

- proactive assessment of objects, equipment, documentation and procedures, for example, through internal estimates;
- Proactive evaluation of human efficiency to verify execution, for example, human security duties, such as periodic checks of competence;
- Reactive estimates for testing the efficiency of the system for control and mitigation of security risks, such as internal and external audits.

As a result, regular improvement can occur only when the organization shows permanent vigilance regarding the effectiveness of its technical operations and its corrective actions, without constant monitoring of security control and measures to improve the consequences, it is not possible to say that the security management process reaches its goals. Similarly, there is no way to measure if SMS performs its goal with efficiency.

1.2.4 Safety Promotion description

Safety Promotion is a set of means, processes and procedures that are used to develop, sustain and improve aviation safety through awareness raising and changing behaviour.

Safety Promotion is one key enabler to reach the ultimate objectives of the EU Safety Management Strategy and contributes to continuous improvement of our aviation safety system in Europe and worldwide, together with regulations and oversight.

Safety Promotion includes improved products and shares, such as reports and technical publications, bulletins, leaflets and posters, audiovisual materials, tools, guides and guides, social networks, and electronic applications, as well as conferences, security measures, roadshows and campaigns Failure Promotion is also on the separation of best practices from the authorities and the industry. Security promotion can also contribute to the spread of regulatory events.

Safety security activity has a great measurement of communication and social marketing. Safety promotion supports communication culture, the distribution of lessons learned and allows constant improvement of the process. Safety promotion requirements are applied not only for organizations providers of aviation services, but more so that states . According to ICAO, SMS framework and Safety Promotion has two elements, notably:

- training and education.
- safety communication.

1.2.4.1 Training and Education

Aviation service providers should develop and maintain a security training program. This ensures that the staff is trained and competent to fulfill their SMS duties. Education programs must be adapted to the needs and complexity of the organization. Safety training should correspond to the participation of each person in SMS.

Providing appropriate training for all employees, regardless of their level in the organization, is mandatory. an indicator of management commitment to an effective SMS. Quality and Training efficiency has a significant impact on attitude and actual performance (professionalism) employees will subsequently demonstrate in their daily work.

According to , safety training and education should consist of the following:

• recurrent safety training,

• a validation process that measures the effectiveness of training,

• a documented process to identify training requirements,

• initial (general) job-specific training,

• indoctrination/initial training incorporating SMS, including Human Factors and organizational factors.

The Fig. 1.2 illustrates the scheme of Training and Education:

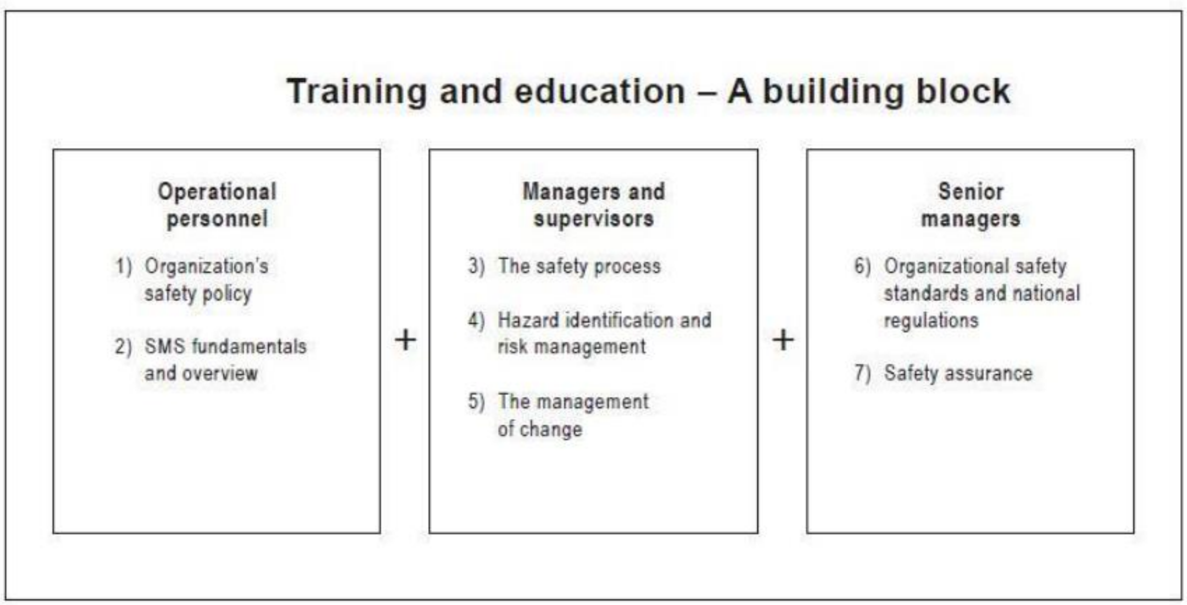

Fig. 1.2 – Scheme of Training and Education

1.2.4.2 Safety Communication

Safety communication in aviation SMS is simply another way of sharing data.

Safety communication IS data sharing. This data sharing happens in several ways:

- Sharing data with compliance authorities;
- Sharing data with other service providers; and
- Sharing data with employees and contractors.

Safety communication has significant implications in safety culture and transparency. You might even say that transparency is simply how much information you communicate.

These are important points because the term "safety communication" does not quite capture the fact that what we are really talking about is:

- The type of safety culture management practices;
- The type of relationship management has with front line employees and other organizations; and
- How much trust management has in employees.

In programs with poor safety culture, it's generally the practice that management restricts communication – i.e., withholds data – and with good reason too. It's important that your company adheres to its own best practices of safety transparency, but also maintains safety communication compliance. Here are the three ways to be compliant with ICAO's safety communication requirements. Safety communication is an important means of improving safety performance. The distribution of safety lessons is a very important element of security, since the lessons learned from past experience are implemented internally, reduce the likelihood of repetition of accidents and incidents and, thus, improve safety. Unfortunately, many factors, such as time, distance, environment and sense of complacency, often lead to lessons that are either not learned or lost. The distribution of lessons can be considered as an indirect form of safe education.

Communication on safety issues is an important means of improving safety performance. The dissemination of safety lessons is a vital element of safety communication, as lessons learned from past experience, implemented internally, reduce the likelihood of recurring accidents and incidents and thus improve safety. Unfortunately, many factors such as time, distance, environment and feelings of complacency often lead to lessons that are either not learned or lost. Dissemination of lessons can be seen as an indirect form of safety education.

1.3 ICAO Safety Management Manual

The development of the ICAO Safety Management Manual, 4th Edition - 2018 (Doc 9859-AN / 474), was initiated following the adoption of Agreement 1 to ICAO Safety Management Annex 19 to accommodate the changes introduced by the amendment and reflect knowledge and experience since the publication of the third edition in May 2013. The fourth edition completely replaces the third edition. To meet the needs of the diverse aviation community implementing safety management and the recommendations emanating from the second high-level safety conference held in 2015, a safety management implementation (SMI) 26 was developed that complements SMM and serves as a repository for the exchange of best practices. experience. Case studies, tools and teaching aids will be collected, analyzed and posted on the website on an ongoing basis. The fourth edition of Doc 9859 is intended to support States in the implementation of an effective State Aviation Safety Program (SSP). This includes ensuring that service providers implement SMS in accordance with Annex 19 provisions. To ensure compliance with safety management principles, a concerted effort has been made to focus on the intended outcomes of each Standard and Recommended Practices (SARP) while deliberately avoiding over-prescriptiveness. Emphasis was placed on the importance of each organization tailoring the implementation of safety management to its specific environment.

The fourth edition is divided into nine chapters designed to progressively deepen the reader's understanding of the fundamental principles underlying safety management. The chapters are grouped under three themes:

Safety Management Fundamentals - Chapters 1 through 3 help the reader understand the fundamental principles.

Practical information for data-driven decision making.

Implementing safety management - Chapters 8 and 9 explain how to apply concepts from previous chapters to institutionalize safety management at the State and service provider level.

CONCLUSION

SMS is a flexible management tool that helps any management system focus on increased security. The safety management system is an integral part of aviation because aviation cannot develop without security. SMS also analyzes and demonstrates the potential threats and challenges faced by any aviation operator.

2 Mi-8 FAMILY RELIABILITY

In this chapter, I want to show statistics of aviation accidents and incidents from 2010 to 2013 based on Mi-8 Family.

Table 2.1 shows the accidents and incidents causes and presented below:

		Modification / Flight number	Location	Victims / On board	Short description
	1.03	Ми-8Т UP-MI817	East Kazakhstan region, Urdzhar district	8 /8	Crashed while flying in adverse weather conditions .

	0.04	Ми-8T RA-22881	Kamchatka Territory, Elizovsky District	**/3**	**2** The crew dropped the skiers on the side of the mountain, and they flew lower and landed the helicopter on a safe hill in anticipation of the descending tourists. During the descent, the skiers caused an avalanche to descend, which, according to an unexpected (according to the results of the commission's investigation) trajectory, covered the helicopter standing on a hill. The flight mechanic and the co-pilot were killed, as well as 8 skiers on the slope. The rest with injuries of varying severity were taken to the hospital.
	.10	/ Ми-8MTB-1 RA-25455	near Sehwan	**/13**	**0** The helicopter flew as part of the UN World Food Program mission in flood-affected areas of Pakistan. An engine failure occurred during one of the flights. The crew made an emergency landing in the flood-flooded area north of Lake Manchar. The water depth at the landing site was about 1.5 m. During landing, the vehicle partially collapsed, the passengers and crew members on board were injured of varying severity.
	.11	Ми-8MTB-2 RF-28532	Sakhalin region, near Yuzhno-Sakhalinsk	**/4**	**4** During the night training flight, the right artificial horizon failed, which was not timely detected by the crew. Subsequently, the autopilot, receiving incorrect information, put the helicopter into a roll that exceeded the operational limits, and the machine stalled with acceleration of the forward flight speed. Due to the transience of events and difficult spatial orientation, the crew was unable to respond in time to the emergency and the helicopter with a large right bank, at a speed of more than 200 km / h, fell from a height of 400 meters into a swampy area. The car burned down, the crew died.
	5.11	Ми-8T RA-22376	Omsk region, Tarsky district, 60 km north-east of the village of	**/11**	**8** When approaching at a height of 5 m, an uncontrolled spontaneous rotation of the helicopter began with an ever-increasing angular velocity. The PIC made an emergency landing and the car fell to the ground, followed by overturning to the

			Petrovka		starboard side about 50 m from the landing site. After the helicopter hit the ground, a fire broke out, as a result of which the passengers in the cargo compartment were killed.
	9.12	Ми-8T RA-24655	Yamalo-Nenets Autonomous Okrug, Yamal Peninsula	**1** **/18**	When approaching in conditions of insufficient visibility (fog), the crew lost ground reference points and, in search of them, ceased to control the readings of the instruments. As a result, the helicopter dropped to a dangerous height, roughly collided with the ground and collapsed. Due to the impact of the rotor blades on the cockpit, the PIC was killed.

	5.03	Ми-8T RA-24436	24 km north of Krasnoyarsk	**/3**	During a training flight with an imitation of one of the engines failure (at an unacceptable altitude, in violation of the airplane flight control), the helicopter crashed, followed by destruction and fire. The crew members were not injured.
	.07	Ми-8T RA-22350	Irkutsk region, Katangsky district, 190 km north of Kirensk	**/12**	When disembarking passengers in hover mode (landing was excluded due to the low density of the soil), the helicopter began to roll to the left. The PIC tried to level the helicopter, as a result of which there was a roll to the right side. At that moment, the right landing gear fell into the ground, the car tilted more strongly, hit the ground with the rotor blades and the helicopter capsized. Three passengers engaged in unloading operations were injured by the blades, two of them died.
	2.07	Ми-8T RA-24278	Komi Republic, 180 km north of Syktyvkar	**/9**	During the landing approach for the landing of firefighters, in the process of hovering at an altitude of about 20 m, the helicopter began to spontaneously rotate to the left. When parrying rotation, the crew did not control the altitude, as a result of which the helicopter landed roughly, capsized on the starboard side and received significant damage. Crew members and 3

					passengers were injured of varying severity.
0	6.07	Ми-8Т RA-22860	Chukotka Autonomous Okrug, 90 km south-west of Keperveem	**/14**	Immediately after, during the control hover, a fire occurred in the cargo compartment, which turned into a fire, which practically destroyed the helicopter. The probable reason is the kerosene heater not turned off and the presence of flammable cargo in the passengers' luggage.
1	9.07	Ми-8Т RA-22387	Sverdlovsk region, Nizhneserginsky district, near the village of Klenovskoye	**/4**	The helicopter crashed while flying around the gas pipeline due to being in unfavorable weather conditions (thunderstorm). The PIC did not make a timely decision to return to the departure aerodrome, continuing the flight at an altitude below the safe one. The car hit the treetops on the top of the hill, the crew went into an emergency landing. In the process of landing, the car hit the ground with the tail rotor, overturned on the left side and collapsed. The PIC was killed..
2	5.07	Ми-8Т RA-24422	Chukotka Autonomous Okrug, Iultinsky District, near the village of Billings	**/5**	When approaching in low visibility conditions (fog), the crew lost control over the spatial position of the helicopter. The car hit the ground, collapsed and partially burned down. A flight mechanic and two passengers were killed in the crash.
3	9.08	Ми-8МТВ-1 RA-25560	Karachay-Cherkessia, near the village of Arkhyz	**/13**	During the landing approach, due to a manufacturing defect in the engine control equipment block, the power of the right engine dropped. As a result of a rough landing, the helicopter collapsed, two crew members and three passengers were injured of varying severity.
4	2.01	Mi-17 VAM-304	the village of Katlanovsko-Blace , 10 km from Skopje	**1/11**	A Macedonian Air Force helicopter transported troops from the EU peacekeeping mission in Bosnia and Herzegovina . A possible cause of the disaster is poor visibility

					(fog).
5	1.01	Mi-8T 10445	8 km from Törökszentmiklos	**/4**	A Hungarian Air Force helicopter crashed during a training flight [2] .
6	8.02	Mi-8T UN-25001	Kyzylorda region , near Zhalagash	**/18**	During the landing approach, an uncontrolled rotation began, the helicopter lost altitude and collided with the ground. The PIC , the co-pilot and three passengers were killed .
7	3.03	/ Mi-8MTV-1 RA-27019	145 km east of Kathmandu	**0/10**	The helicopter of the UN mission was flying in unfavorable weather conditions (thunderstorm clouds). The crew lost their spatial orientation, the engines were turned off, the car fell on a mountainside at an altitude of 1300 m and burned down .
8	8.03	Mi-8MTV-1 EY-25169	13.5 km from Khorog	**/14**	Crew error. When approaching a landing site selected from the air in a mountainous area and with a helicopter mass that is the maximum for flying at a given altitude, the crew lost control and allowed the vehicle to collide with a mountain slope. The PIC was killed, two passengers were injured. The helicopter burned down completely [5] .
9	7.03	Mi-8 07	Black Sea , Noon Island	**2/13**	Helicopter GPS of Ukraine . Sent from Vilkovo to Zmeinyi Islandunder the control of 3 crew members with 10 passengers (border guards and 1 civilian specialist). Fell in shallow water from a height of 300 meters, possibly for a technical

					reason [6] .
0	0.03	Mi-8MT RA-06152	Spitsbergen , Barentsburg	**/9**	When landing in adverse weather conditions (heavy snowfall and gusty wind), the crew lost their spatial orientation in the snow lifted by the propellers. When attempting to withdraw the second circle helicopter hangar faced with a 100 m from the landing pad. PIC, flight mechanic and one passenger were killed .
1	8.04	Mi-8T UR-24275	Black Sea , 70 km from Cape Tarkhankut	**0/20**	When attempting to land on the offshore drilling rig site in a strong crosswind (~ 7 m / s), the crew could not keep the vehicle within the landing site, which, having shifted, hooked the tail rotor onto the rig support, fell and, destroyed, burned out. All on board were killed .
2	1.05	Mi-171 n.d.	Sichuan Province , Wenchuan County , near Yingxiu	**8/18**	The PLA helicopter crash ed in a mountainous area at an altitude of 2800 m during the evacuation of victims of the Sichuan earthquake . All on board were killed (including 5 crew members). The crash site of the car was discovered on June 10 .
3	2.06	Mi-8T RA-22599	YaNAO , 340 km northeast of Nizhnevartovsk	**/16**	During the landing approach, the main rotor speed dropped. The car with high vertical speed roughly landed on the landing pad, rolled out of it and, collapsing, burned up. 9 passengers were killed. The exact reasons for the incident remained unclear .
4	6.10	Mi-8MTV-1	Republic of Tatarstan , Zelenodolsk district , New	**/5**	During the flight, the helicopter control system failed due to mechanical failure. At the command of the PIC, only the

		w / n	Tura		co-pilot was able to leave the board by parachute (he received numerous injuries because the parachute did not have time to fully open due to the low altitude). The rest of the crew and the passenger died in the vehicle that lost control .

As a result, we can plot the number of failures per unit of time and get a graph that will show us how often helicopter Mi-8 are exposed to accidents and incidents:

Due to the fact that the helicopter is widely used in military aviation, a lot of accidents happened during the hostilities.

As a result, we can plot the number of failures per unit of time and get a graph (look at Fig. 2.1)

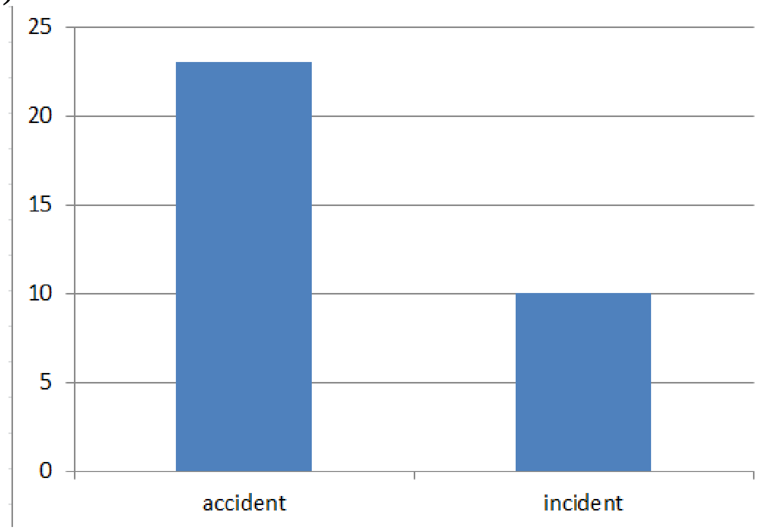

Fig. 2.1 - Failures Per Unit of Time

ICAO ACCESS TO HAZARD IDENTIFICATION AND RISK ASSESSMENT

3.1 Hazard Identification

A hazard is any source of potential damage, harm or adverse health effects on something or someone. Risk is the likelihood that the danger will cause harm. The danger search process includes the definition of both existing and potential hazards in the workplace, assessing the risks, identification and implementation of control and consideration of hazards.

A hazard is anything with the potential to cause harm. A hazard is any condition, occasion, or circumstance which may initiate a mishap. Hazard is any existing or potential condition that can lead to damage, sickness, or death to individuals; harm to or misfortune of a framework, hardware, or property or harm to the environment. A hazard could be a condition that might cause (could be a prerequisite to) a mischance or occurrence.

Three essential and recorded forms for weakness danger distinguishing proof: Predictive - Recognize fatigue dangers by looking at the group (e.g., bio-mathematical models). Proactive - Recognize fatigue dangers inside the current flight (e.g., group weakness overviews). Reactive - Recognize the commitment of fatigue risks to reports and occasions related to potentially negative security result (e.g., weakness reports).

One of the most important elements of the health and safety management system is the identification of danger. This is a basis for developing safe work processes, creating preventive programs and providing other precautions to eliminate or control hazards.

Employers are legal responsibility for identifying and control, to the best of their abilities, dangers in the workplace to protect workers. Similarly, workers have the right to know about the dangers of work and how to protect themselves, and the duty to comply with the rules of the company, which describe the processes of hazard control. It is the responsibility of all employees to understand what a danger, what risk is how danger can affect people, property and the environment and how to prevent injury or illness from this danger.

3.1.1 ICAO Requirements

The recently approved amendments to the Annexes to the Chicago Convention are a set of requirements for the implementation and operation of SMS by aircraft operators and aviation service providers. Within a reputable SMS system, operators / service providers “must establish and maintain a formal process for successfully collecting, recording, taking action and generating inputs to near operational risks, based on a combination of reactive, proactive and predictive safety data collection strategies".

3.1.2 Hazard Identification Sources

The safety assessment process in the design and certification process identifies and classifies most of the dangers, assesses the risks and introduces controls - this is a good starting point to determine the dangers of work, and in the best rompering should be a clear connection between design and certification and operations:

- internal investigation of safety occurrences;
- safety reporting - includes safety occurrence reporting through mandatory and voluntary reporting schemes;
- information provided by personnel, from operational perspective and training;
- safety occurrence trend analysis;
- results from safety surveys and operational oversight safety audits carried out internally (by the operator/service provider) and by States;
- analysed data from automated data collecting tools (e.g. flight data analysis (FDA) in the airline industry);
- monitoring of "day-to-day" normal operations and environment;
- information-exchange practices between operators/service providers;
- official State investigation results of accidents and serious incidents; and.

3.1.3 Hazard Identification Methods

The SMS Working Group of the European Commercial Aviation Safety Team (ECAST) has produced guidance material on hazard identification for airline operators. The document provides a summary of a number of specific tools and techniques for hazard identification and lists their advantages and disadvantages.

Depending on the sources of hazard identification and approach to determining the risk, two groups of hazard identification methods can be identified:

- Reactive hazard identification methods - hazards are recognised through trend monitoring and investigation of safety occurrences. Incidents and accidents are clear indicators of systems' deficiencies and should be therefore investigated to determine the hazards that played role in that event.
- Proactive hazard identification methods - hazards are identified analysing systems' performance and functions for intrinsic threats and potential failures. The most commonly applied proactive methods are the safety surveys, operational safety audits, safety monitoring and safety assessments. Other methods, such as FDA,

specifically designed to track normal operations (trends), and Line Operations Safety Audit (LOSA) and Normal Operations Safety Survey (NOSS) designed to capture real life strategies (i.e. human performance), play an important role in proactive hazard identification.

In real storage scenarios, both reactive and proactive methods provide an effective means of determining the danger. The study of the incident is still one of the participants in the detection of dangers. In successful security management systems, a proactive approach to identify danger expands, so the danger is recognized and addressed before it can turn into an emergence.

According to the Future Aviation Safety Team (FAST) three complementary approaches should be used to identify hazards that affect safety of the global aviation system:

- The "Historic" approach is based on accident and incident investigation and analysis. It uses proven investigative techniques to discover all facts pertinent to a past aviation incident or accident, and thus identify opportunities for improvements meant to avoid future, similar accidents.
- The "Diagnostic" approach is targeted at identifying accident pre-cursors within the larger collections of information in various aviation safety reporting systems. There are many diagnostic processes being developed for application to the global aviation system.
- A "Prognostic" or "Predictive" approach is aimed at discovering future hazards that could result as a consequence of future changes inside or outside the global aviation system, and then initiating mitigating action before the hazard is introduced. Prognostic hazard identification informs design processes so that the hazards can be eliminated from the future, avoided in the future, or mitigated in the future.

European Aviation Safety Agency (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.

3.1.4 Scope of Hazards in Aviation

The range of hazards in aviation is very wide. That is why the detection of danger is difficult, because it takes into account the wide range of possible sources of failure. Depending on the nature and size of the organization, its operating area and the environment, various factors should be taken into account when determining the hazards. Factors are listed examples of common hazards in aviation:

- procedures and operating practices, including their documentation and checklists, and their validation under actual operating conditions;
- design factors, including equipment and task design;
- personnel factors, such as company policies for recruitment, training and remuneration;
- communications, including the medium, terminology and language;
- work environment factors, such as ambient noise and vibration, temperature, lighting and the availability of protective equipment and clothing;
- organisational factors, such as the compatibility of production and safety goals, the allocation of resources, operating pressures and the corporate safety culture;
- regulatory oversight factors, including the applicability and enforceability of regulations; the certification of equipment, personnel and procedures; and the adequacy of surveillance audits; a
- 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.

3.1.5 Hazard Classification

Hazard classification, the severity of risks, is halfway to risk assessment. Each identified hazard must be assessed and classified. Usually exhausted measures to determine whether the risk is individual (i.e, has results for a specific operation / operations) or systemic. Risks are categorized in terms of the severity of the outcome arising in the event of an event and recorded in a hazard log. This descriptor is registered and included in the database, which aids in capacity expansion and recovery of risk data. Hazard classification networks are used by operators / service providers and aircraft manufacturers to assess risks. The hazards are divided into 5 non-specific classes depending on their impact. It should be noted that the precise description of potential impacts may vary depending on the types of aviation services provided. Table 3.1 shows the case of hazard severity classification as shown below:

Hazard Class	**1 (most severe)**	**2**	**3**	**4**	**5(least severe)**
Effect on Operations	Normally with hull loss. Total loss of flight control, mid-air collision, flight into terrain or high speed surface movement collision.	Large reduction in safety margins or aircraft functional capabilities.	Significant reduction in safety margins or aircraft functional capabilities.	Slight reduction in safety margins or aircraft functional capabilities.	No effect on operational capabilities or safety.
Effect on Occupants	Multiple fatalities.	Serious or fatal injury to a small number of passengers or cabin crew.	Physical distress, possibly including injuries.	Physical discomfort.	Inconvenience.
Effect on Air crew	Fatalities or incapacitation.	Physical distress or excessive workload impairs ability to perform tasks.	Physical discomfort, possibly including injuries or significant increase in workload.	Slight increase in workload.	No effect on flight crew.
Effect on Air Traffic Service	Total loss of separation.	Large reduction in separation or a total loss of air traffic control for a significant time.	Significant reduction in separation or significant reduction in air traffic control capability.	Slight reduction in separation or slight reduction in air traffic control capability. Significant increase in air traffic controller workload.	Slight increase in air traffic controller workload.

Table 3.1 Case of Hazard Severity Classification

Another important characteristic of hazards is their probability (frequency) of the occurrence. The seriousness of the danger and its possibility of events are used to explore the danger that the risk may be submitted to the provision of aviation services specific to aviation operations and inevitable person. An organized approach to hazard identification guarantees that, as far as possible, all potential dangers are defined and evaluated. Danger assessment should take into account all possible results, from the smallest to the most likely. Hazard definition incredibly determines the adequacy of the organization's risk management process, since it provides inputs with two two risk management components, especially risk assessments and mitigating risks.

3.2 Risk Assessment

Risk assessment is the second stage in the risk management process. After the danger and their effects were revealed during the first step using hazard identification, it is necessary to assess the possibility of affecting the danger and the importance of these effects of danger . The risk assessment process includes the following stages of work:

- residual risk assessment;
- risk analysis;
- assessment of its admissibility;
- risk calculation;
- in case of exceeding the permissible level, exclusion of the threat.

The risk analysis of each threat is the process of determining the properties and characteristics of risk. The meaning of the analysis of threats is to determine the risk of each identified threat regarding admissible consequences.

Calculation of the risk level is a combination of the likelihood and severity of the consequences of a hazard. Risk criteria are based on two main indicators of risk: the likelihood and the severity (severity) of the consequences:

- at the first stage, the probability of its manifestation is determined for each threat, after which they are ranked in accordance with
- the established scale of probability and criteria of severity of consequences and the location of the characteristic is found.
- at the second stage, the level of risk is determined in accordance with given division.

The probability - as an integral element of the risk determination process is defined as the incidence of an adverse effect or the result of a hazard and / or hazardous factor in this period (per month, quarter, year) and / or within a month of flying.

The risk matrix is used to determine the level of risk.

A risk matrix is a tool for classifying and presenting risks by ranking the likelihood of severity of consequences.

		Consequence				
		Insignificant	Minor	Moderate	Major	Severe
Likelihood	Almost certain	Medium	High	High	Extreme	Extreme
	Likely	Medium	Medium	High	Extreme	Extreme
	Possible	Low	Medium	Medium	High	Extreme
	Unlikely	Low	Low	Medium	High	High
	Rare	Low	Low	Low	Medium	High

Fig. 3.1 Risk Matrix

Assessment of risk tolerance. Produced by comparison with a target level of risk. For each service provider, the government sets a predetermined safety level.

Each seller of services (including airlines) takes a predetermined security level for their activities, taking into account the specifics of their implementation. Acceptable risk when performing mixed actions is established by the method selected by its control.

If the acceptable level of risk is exceeded, take corrective action and reduce or eliminate the threat.

Residual risk assessment. After completing each corrective action, the organization, service, department, performer (specialist) assesses the residual level of risk. The fact of reaching an acceptable level of risk is recorded in the "Hazard Control Chart" issued by the Airline.

3.2.1 Residual risk assessment

Residual safety risk contains an undisclosed risk. Its control by monitoring the effectiveness of the selected measures is an integral part of the risk management process. It is carried out after a specified time after corrective actions have been taken.

Safety risk mitigation measures are assessed as effective if the residual risk significance category does not imply the need for additional risk mitigation measures.

3.2.2 Impact on risk

The main types of safety risk management measures are:

- professional training of personnel;
- (including changes in regulatory documents);
- administrative and organizational measures;
- technical measures.

3.2.3 Formation of a positive safety culture

It is obvious that every specialist will become an active participant send an SMS if he is confident that the airline has created a “non-punitive” disciplinary work environment in which unintentional errors, provoked violations and incident reporting are not punishable.

The current stage in the development of safety culture is called a positive safety culture. A positive safety culture is a fundamentally new culture based on sensitivity to hazards and / or hazards, encouraging people to report them. This implies shared responsibility for safety, wide dissemination of information about hazards and their factors, a systematic approach to their elimination and welcomes fresh ideas.

3.3 Flight safety

Aviation safety is the state of the aviation system or organization in which the risks associated with aviation activities related to or directly supporting the operation of the aircraft are reduced to an acceptable level and are under control.

Flight safety is determined by the ability of an aviation transport system to carry out air transport without a human life and human health. The aviation transport system includes aviation (helicopter), crew, preparation for flight service and maintenance and maintenance. Flight results affect a large number of factors, samples of which are very complicated, and in many cases have not yet been studied. The safety of flights in a broad sense can be characterized as a set of measures taken when creating an airplane and its operations to maintain the health of crews and passengers. To ensure the safety of flight, it is necessary to provide and virtually implement all the necessary measures for special training and accurate execution of the experience of experience and eclipse, the reliability of aviation equipment and aircraft training, as well as the correct forecasting and assessment of the situation and meteorological conditions, in which the flight will be performed. These events based on the study, practical flight experience and an integrated advantage analysis included in the flight documentation. Work, work and measures to improve organization, technical equipment and advanced training of personnel of all air transport services are conducted in air transportation.

The assessment of the state of flight safety is carried out according to quantitative indicators, as which the International Civil Aviation Organization uses the level of flight safety, defined as absolute (the number of aviation accidents) and relative (the number of accidents per 100 thousand people). flight hours or per 100 thousand flights) and other indicators ... According to available estimates, the level of safety of air transportation of passengers is average and safer than rail and road transport. On average, the probability of an accident for a passenger does not exceed 1 in 500 thousand flights.

Not a single type of human activity and not a single artificial system can be absolutely safe, that is, free from risks. Security is a relative term that implies that there is an acceptable level of risk in a "secure" system. Accordingly, safety is seen as a result of risk.

Factor management, that is, a state in which the risks of harm to people or material damage are reduced to an acceptable level and maintained at this or lower level by systematically identifying sources of danger and controlling risk factors.

Basic principles of ensuring a high level of flight safety:

- creation of effective state control over ensuring flight safety at all stages of the creation and operation of civil aircraft;
- organization and improvement of the system of investigations of aviation accidents and incidents;
- maintaining in constant readiness the system for ensuring the survival of passengers and crew members in the event of special situations in flight;
- organization of measures to ensure the safe flight operation of aviation equipment;
- organization of meteorological flight support;
- development and control over the implementation of the rules establishing air traffic services;
- operation of airports, civil airfields, airways and their equipment based on government regulations and technical requirements;
- organization of aircraft technical operation based on design, production and operational documentation. The use of regulations for maintaining airworthiness for each type of aircraft and the aircraft fleet as a whole, including lists of rules for their preparation for flights and periodic maintenance;
- strict regulation of design, construction, testing and certification parameters of aircraft, engines and equipment.

3.3.1 Safety strategy development flights based on risk assessment

Improving the overall safety of aviation security through the air transport system is the fundamental and decisive strategic goal of ICAO. ICAO is always working to ensure and improve the state of aviation security worldwide by implementing the following coordinated activities:

- implementation of programs to resolve issues related to flight safety;
- policy and standardization initiatives;
- safety analysis;
- monitoring the main trends and indicators in the field of flight safety.

The second printed edition of the ICAO Global Aviation Safety Report is intended to provide ICAO States, the aviation community and passengers with a comprehensive account of the ambitious global aviation safety programs implemented by ICAO and its partners.

This unique approach exits the definition and monitoring of global security metrics, which underlie the practical risk analysis and serve as the main part of the Action and Programs of the Organization. This publication provides an overview of achievements and initiatives that contribute to the improvement of aviation safety and promotion and inspiring air transport operators to participate in the development and implementation of innovative and practical programs to improve all aspects of aviation security.

3.4 Aircraft airworthiness

The capitality is a characteristic of an aircraft, which is provided by the principles established and implemented in its design and operating parameters, and provides a safe flight, must be carried out under the expected conditions and in accordance with the established methods of work.

The capitality has a number of aspects associated with the legal and physical condition of the aircraft. The term "airworthy" means that the aircraft or one of its components correspond to the design of its type and is in a state of safe operation.

This definition includes a broader definition that includes people on the ground (third parties): “Airworthiness is the ability of an aircraft or other onboard equipment or system to operate in flight and on the ground without significant hazard to the flight crew, ground crew,passengers or third parties; it is a technical attribute of material assets throughout their entire life cycle. "

In addition, the aircraft must operate within the limits established by the Flight Manual; an aircraft exceeding any limit could jeopardize its airworthiness. The aircraft in service must also be serviced according to its approved maintenance schedule remain airworthy; lifetime service will be included in the term "continued airworthiness".

Airworthiness standards establish requirements for functional systems aircraft that follow from the analysis of their impact on flight safety:

- the functional system should be easy to operate, be able to switch to any operating mode provided for in the flight manual, and be equipped with an alarm and means of monitoring its performance;

- functional systems must be practically reliable, since failures lead to emergency or catastrophic situations, and their redundancy must ensure the continuation of a safe flight after two successive failures;

- the structurally functional system of the aircraft should be designed in such a way that the crew could detect the failure in time, prevent its negative consequences and fly with the failed element or system;

- means for monitoring the performance of the functional system or its elements, built into the aircraft structure, should not reduce the reliability of the functional system and its components;

- the design of the functional system, together with the elements of its control and management, can minimize the possibility of making mistakes both during flight and during maintenance.

3.4.1 Aircrfat airworthiness as the important part of Flight safety

The relationship between airworthiness and security is clear, but complex. The action plan, in addition to generating the appropriate certification code, is regularly aimed at improving the financial issues of the aircraft and benefit both the manufacturer and the operator. Thus, certification authorities will thus consider all the prospects for the plan and development of the aircraft, in fact, when there is a clear improvement to minimal measures.

When an aircraft is to be assessed as meeting all certification requirements, it is issued an Aircraft Type Certificate (ATC).

Airworthiness deficiency can be detected after an accident or accident in operation.

They may refer to unclear failures, errors or obstacles in the Model Plan and / or failure to meet the conditions of safe operation. Their work, known as the Commercial Aircraft Certification Process Study, could provide a valuable meta-analysis of the interactions between certification, operation and maintenance, yielding 15 results and two observations for proposed improvements.

3.4.2 Defects, failures and threats

A malfunction can have a significant impact on security and, if not fixed or partially corrected, can also cause an accident at a later time. Wrong crew actions in response to a breakdown occurring in flight can also lead to the worst result. In such cases, the investigation should consider the crew's reaction, as well as at the heart of the treatment of airworthiness. However, in many cases, the flight team successfully restored the plane after the emergence of anomalies. Some of them are physical processes, such as overload and fatigue, and some are associated with human factors and obsolescence. Below is a list of potential failures or threats that may affect the capacity of the aircraft:• inadequate or incomplete maintenance;

- errors in maintenance which may result in a fault becoming obvious a long period after the error was originally made;
- ageing components;
- change of usage or unmonitored operation;
- lack of configuration control;
- obsolescence and/or legislation change;
- fuel and fuel system hazard;
- lack of adequate oversight of the operator, its practices and policies including training, operation and maintenance by the regulator;
- overload;
- operation outside the certificated limits such as those laid down for flight in ice or snow conditions;

- component degradation due to fatigue, creep, fretting, wear or corrosion, depending on the system or component;
- accidental damage and environmental damage;
- procedural (design, manufacturing, maintenance or supply) error and human factors;
- deficiencies in the process which led to the issue of the original aircraft Type Certificate.

3.4.3 Process for obtaining a certificate

The first defense is the aircraft type certification process leading to the issuance of the Type Certificate. This work is documented so that it remains an available basis for maintaining the airworthiness of this type of aircraft in the future.

Wherever possible, redundancy will be implemented in the original design , that is, allowance for system or component failure without any loss of airworthiness. In some cases, the failure becomes noticeable only after the aircraft has landed and must be eliminated before further flight. In more extreme cases, a serious failure, such as an engine failure in flight in a multi-engine aircraft, should not result in an accident — the design, combined with crew training, should ensure the safe continuation of the flight. The same criteria apply to operations in adverse weather and human factors during operation or maintenance. High standards of flight crew training, skill and resource management can also serve to minimize flight crew mismanagement in the event of any decline in airworthiness in flight.

Therefore, it is very important to understand the human factors issues associated with design and service. Effective management of continued airworthiness is excellent protection. Defined as all processes to ensure that an aircraft meets applicable airworthiness requirements and is operated safely at any point in its life. As part of ongoing airworthiness management, each aircraft must have an Airworthiness Certificate attesting that it is type certified and is in a condition for safe operation. In the European Union (EU), all aircraft must also undergo regular audits leading to an Airworthiness Verification Certificate (ARC). The regulatory body will require the operator to have a system in place to ensure that the following steps are followed. Some airworthiness authorities cover the following items with the term Certificate of Maintenance Review (CMR):

• elimination of identified defects and investigation of problems related to reliability;

• implementation of mandatory revisions and checks;

• compliance with the maintenance program;

3.4.4 Issuance and maintenance of validity of the airworthiness certificate

A certificate of airworthiness is issued by a Contracting State based on satisfactory evidence that the aircraft meets the design requirements of the relevant airworthiness regulations.

A Contracting State will not issue or endorse a certificate of airworthiness that it expects to be recognized in accordance with Annex 33 of the Convention on International Civil Aviation if it does not have sufficient evidence that the aircraft complies with the applicable Standards of this Annex, while ensuring compliance relevant airworthiness regulations.

The certificate of airworthiness shall be renewed or maintained in accordance with the laws of the State of Registry, provided that the State requires the continued airworthiness of an aircraft to be determined through regular inspections at appropriate intervals, taking into account the duration and nature of the operation. , or based on such a system. government-approved controls that will provide at least equivalent results.

When an aircraft holding a valid airworthiness certificate issued by one Contracting State is entered on the register of another Contracting State, the new State of Registry, by issuing its airworthiness certificate, may, in whole or in part, review the previous airworthiness certificate. be sufficient evidence of the aircraft's compliance with the applicable Standards. of this Appendix due to its compliance with the relevant airworthiness regulations. Note. Some Contracting States Promote Aircraft Registration another State by issuing an “Export Airworthiness Certificate” or a document with a similar name. Such a document, although not valid for flight purposes, serves as confirmation by the exporting State of the positive results of the last airworthiness test of the aircraft. Guidance material regarding the issuance of an

“Export Airworthiness Certificate” is contained in the Airworthiness Manual (Doc 9760).

If the State of Registry, instead of issuing its own certificate of airworthiness, recognizes the certificate of airworthiness issued by another Contracting State as valid, it must validate its validity by an appropriate document that must be kept with that certificate,recognition of it as the equivalent of a national certificate. The validity of the recognition document does not exceed the validity period of the current airworthiness certificate. The State of Registry shall ensure the continued airworthiness of the aircraft.

3.4.4.1 Standard form of certificate of airworthiness

The Fig. 3.2 illustrates standart form of certificate of airworthiness:


UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION—FEDERAL AVIATION ADMINISTRATION
STANDARD AIRWORTHINESS CERTIFICATE

1 NATIONALITY AND REGISTRATION MARKS	2 MANUFACTURER AND MODEL	3 AIRCRAFT SERIAL NUMBER	4 CATEGORY

5 AUTHORITY AND BASIS FOR ISSUANCE
This airworthiness certificate is issued pursuant to the Federal Aviation Act of 1958 and certifies that, as of the date of issuance, the aircraft to which issued has been inspected and found to conform to the type certificate therefor, to be in condition for safe operation, and has been shown to meet the requirements of the applicable comprehensive and detailed airworthiness code as provided by Annex 8 to the Convention on International Civil Aviation, except as noted herein.
Exceptions

6 TERMS AND CONDITIONS
Unless sooner surrendered, suspended, revoked, or a termination date is otherwise established by the Administrator, this airworthiness certificate is effective as long as the maintenance, preventative maintenance, and alterations are performed in accordance with Parts 21, 43, and 91 of the Federal Aviation Regulations, as appropriate, and the aircraft is registered in the United States.

DATE OF ISSUANCE	FAA REPRESENTATIVE	DESIGNATION NUMBER

Any alteration, reproduction, or misuse of this certificate may be punishable by a fine not exceeding $1,000 or imprisonment not exceeding 3 years, or both. THIS CERTIFICATE MUST BE DISPLAYED IN THE AIRCRAFT IN ACCORDANCE WITH APPLICABLE FEDERAL AVIATION REGULATIONS.

FAA Form 8100-2 (8-82) GPO 882-874

Fig. 3.2 - Standard Form of Certificate of Airworthiness

According to Article 29 of the Convention on International Civil Aviation, a certificate of airworthiness must be carried on board every aircraft engaged in international air navigation.

3.4.4.2 Aircraft restrictions

Each aircraft is accompanied by flight manuals, tables, charts or other documents containing the approved limits within which the aircraft is considered airworthy as determined by the relevant airworthiness requirements. It also contains additional instructions and information necessary to ensure its safe operation.

3.4.4.3 Temporary loss of airworthiness

Failure to maintain the airworthiness of an aircraft as defined by the relevant airworthiness requirements results in the aircraft becoming unusable until its airworthiness is restored.

3.4.4.4 Aircraft damage

In the event of damage to an aircraft, the State of Registry shall decide whether the damage is such that the aircraft is no longer airworthy as determined by the relevant airworthiness regulations.

If damage occurred or was discovered while the aircraft was in the territory of another Contracting State, the authorities of that State have the right to prevent the aircraft from continuing to fly, provided that the State of Registry is immediately notified and all the necessary details are sent to it for making a decision.

If a State of Registry considers that damage to an aircraft has rendered it unfit to fly, that State shall prohibit the resumption of flights of that aircraft until its airworthiness is restored. However, in exceptional cases, state registration may, subject to certain restrictions, allow an aircraft to operate a non-commercial flight to an aerodrome, where it will be restored to airworthiness. In setting specific restrictions, the State of Registry shall take into account any restrictions proposed by the Contracting State that originally prohibited the aircraft from continuing to fly.

This a Contracting State shall authorize such flight or flights subject to the established restrictions.

When the State of Registry considers that the damage to the aircraft does not render it unfit to fly, the aircraft is allowed to continue flying.

3.5 Aviation Safety Reporting System

Voluntary reporting is a widely recognized element of any modern regulatory system.

Today, accidents to aircraft of American airlines are so rare that further improvement of flight safety increasingly depends on identifying new risks as potential prerequisites for real disasters.

Basically, such events are known only to those who took a direct part in them, and the leaders, if the corresponding message is not received, may not know about them. The main programs in this area are:

- flight Operations Quality Assurance Program (OQAP);
- the Voluntary Incident Reporting Program (VIRP) used by airlines and other regulated entities;
- the Aviation Safety Action Program (ASAP) used by operators, including programs for pilots, mechanics, flight attendants and air traffic control services.

The group reaffirmed the importance of voluntary reporting programs as vital to the continuous improvement of aviation safety. These programs are in line with current regulatory practice and have clear application boundaries. The Panel also confirmed the importance of adhering to rules and restrictions on voluntary reporting programs to ensure their confidentiality and to prevent industry incentives for non-compliance.

Panel members expressed concern about possible misinterpretation of many of the issues, including those faced by airlines. They stressed that it is wrong and dangerous to arbitrarily interpret concepts such as "good" or "bad" without applying systemic or scientific approach to them. It is also important that participation in all voluntary reporting programs is accompanied by guarantees of confidentiality of information sources.

3.5.1 European Voluntary Safety Reporting System

In October 2005, the Voluntary Incident Reporting Program (VIRP) was established. The members of the Group stated that voluntary reporting and sharing of security databases are indispensable parts of improving security.

Over the past ten years, 22,300 messages from 340 aircraft operators and 22,200 messages from air navigation service providers have been collected and processed. Its VIRP system involves not only airlines and air navigation service providers, but also international organizations such as the International Air Transport Association (IATA), the International Air Carriers Association (IACA) and the European Regional Airlines Association (ERAA). At the joint meetings, safety data is exchanged, new risk trends are analyzed and discussed. The seventeenth VIRP newsletter was recently released, covering the period 2011-2015.

Early identification of factors that could negatively affect future flight safety allows proactive measures to be taken and eliminated or minimized before they become a real threat.

VIRP program managers highlight the main areas of work: a missed approach (this is a normal phase of the flight, a missed approach is usually the result of other safety issues), unauthorized climb, TCAS RA activation, similar radiotelephone call signs, loss communications, blinding lasers, remotely controlled aircraft systems (drones) and loss of GPS signals.

3.5.2 Applicable ICAO Standards

Contracting States to the International Civil Aviation Organization (ICAO) have agreed in Appendix 13 - Aircraft Accident Investigation to the Chicago Convention that States must investigate all aircraft accidents within their territorial boundaries. In addition, "… the State should establish a mandatory incident reporting system to facilitate the collection of information on actual or potential safety deficiencies". In addition, it is recommended that "the State establish a voluntary incident reporting system to facilitate the collection of information that cannot be captured by a compulsory incident reporting system. A voluntary incident reporting system should not be punitive and should not protect sources of information. " In addition, it is required that "... the State that has established the accident and incident database and incident reporting system, analyze the information contained in its accident / incident reports and database to determine any required warning action ". Thus, the requirements for national reporting systems are clear and accompanied by an additional requirement to create analytical capabilities to maximize the safety benefits derived from the lessons learned from incidents and their investigation.

3.5.3 Applicable European Requirements

The announcement, investigation and tracking of civil aviation events has the specific purpose of enhancing aviation safety by ensuring that relevant safety data related to civil aviation is recorded, collected, retained, stored, exchanged, disseminated and analyzed.

The regulation requires States to enact national legislation under which accidents are reported to competent authorities by a wide range of aviation practitioners, including:

- designers, manufacturers or those who service or modify gas turbine aircraft or public transport;
- operators or commanders of turbine-powered or public transport aircraft;
- those who sign certificates of inspection, maintenance or commissioning of a turbine aircraft or public transport;
- managers of airports offering access for Community air carriers to intra_Community air routes;
- those who install, modify, maintain, repair, overhaul, flight-check or inspect air navigation facilities;
- persons involve in the ground-handling of aircraft, including fuelling, servicing, loadsheet preparation, loading, de-icing and aircraft towing.

The Regulation also requires Member States to "… designate one or more competent authorities to establish a mechanism for the independent collection, assessment, processing, analysis and storage of reported incidents…". At the European level, further legislationunder development that will require national reporting systems to submit data to EASA.

All relevant data must be submitted to the European Central Repository, administered by the Commission.

3.5.4 Coordination of Requirements

Different needs that arise from European states as a result of their participation in European bodies were adopted, and measures were taken. The relevant World Associations agreed with broad coordination to ensure that all relevant requirements be applied to the maximum possible degree to definitions and the scientific categories used as reliable as possible. In addition, the achievements of innovations have expanded opportunities for data trading and can help limit the number of split reports that must be submitted by the government.

3.5.5 Non-Punitive Reporting

A feature of all of the above international provisions is that they are accompanied by the requirement that all messages be non-punitive. In this context, ICAO Annex 13 and: “The sole purpose of incident reporting is to prevent accidents and incidents and not to blame or accountability.”

In practice, it is now widely accepted that no system can and should not be completely flawless. Situations of gross negligence, willful misconduct or criminal conduct should be dealt with with appropriate penalties applied to the persons concerned.

However, it is necessary to find the difference these situations and events in which professionals come with good intentions and in their capabilities, that is, between real fasteners, omissions and errors. It is equally recognized that it is very important to hit the right balance. Otherwise, inadequate treatment of such cases can seriously undermine the viability of national reporting systems.

3.6 Audit system

A safety audit is the main security management activities that make it possible to identify potential problems that have recently affected security. Safety compliance audits are accurate and independent verification by or on behalf of the national authority.

The oversight body to determine whether all safety measures, or their elements related to the forms and their results, items or services, the required safety related measures, and how successfully they are implemented and whether they are reasonable forimplement the expected results.

Safety audits comply with relevant security regulatory requirements and SMS procedural measures, if any. They strive to provide proof of security management,functions, including staffing, adherence to relevant guidelines, levels of competence and training.

Safety audits are conducted by one person or group of people who are competent (sufficiently qualified, experienced and trained) and have a satisfactory degree of independence from the auditee or department. The frequency of audits depends on the regulatory / management policy. For example, some government agencies may conduct annual security audits; others may feel that a full security audit is needed only at intervals of several years. Special security audits can be conducted to verify the conformity of a specific component or system activity, or they can be initiated after an incident. In accordance with ICAO SARPs, safety audits must be carried out on a regular and systematic basis. Typically, the frequency and scope of security audits is established in a specific annual security audit program of the responsible authority / organization. Security audits are one of the main methods of meeting security performance monitoring requirements. Often audits are integrated, i.e. include not only safety but also other business processes and performance areas such as quality, capacity, cost-effectiveness, etc. Safety audit is a safety management element that exposes operators to airlines / service providers systematic critical appraisal.

Audit may include several components of the general system, such as security policy, change control, general SMS, operational procedures, emergency procedures, etc. The permissible risk and development of measures to eliminate it. The result of the audit will be in the report followed by the Action Plan prepared by the auditor and the approved regulatory / control authority. The implementation of agreed security enhancements should be monitored by the supervisory authority. Security audits are used to ensure:

- effective arrangement exist for promoting safety, monitoring safety performance, and processing safety issues;
- adequate arrangements exist to handle foreseeable emergencies;
- organization’s SMS has a sound structure and adequate staffing levels;
- approved procedures and instructions are complied with;
- the required level of personnel competency and training to operate equipment and facilities, and to maintain their levels of performance, is achieved.

All audits should be planned in advance and supporting documentation (usually in the form of checklists) should be completed. Among the main steps in organizing an audit will be to test the feasibility of the proposed plan and to identify data that will take some time at the very beginning of the audit. You also need to specify the criteria by which the audit will be conducted and create a detailed audit plan along with additional checklists to be used during the audit. The conduct of this audit is primarily a preparation for an assessment or finding of facts. Data from almost any source can be surveyed as part of the audit. Data collection procedures include:

- interviews with staff;
- observations by the audit team;
- review of documentation.

The results of the security audit confirm the effectiveness and overall health of the organization's SMS. Audits that limit perceptions of non-compliance are of limited value because they do not empower the auditee to act proactively. The review of the report should be an objective presentation of the results of the security audit. Key standards to follow when improving the audit report:

- consistency of perceptions and recommendations;
- conclusion substantiated with references;
- observation and suggestions expressed clearly and concisely;
- avoidance of simplifications and unclear observations;
- the objectivity of observations;
- avoidance of feedback of people or positions.

According to safety audits, this is a proactive security management action that allows you to identify potential problems that have recently been related to security.

Therefore, safety audit has characteristics that are relevant to both the safety assurance of an SMS and the hazard identification component of the hazard management. Security auditmay be conducted remotely by an authorized government regulatory body, internally by an aviation service provider, or by a qualified third party safety auditor such as an advisory office. In any case, the driving restrictions behind the audit, actions andthe profitability of both internal and external audit is the same.

3.6.1 Regulatory Safety Audits (external auditing)

Under the Chicago Convention, States are required to implement a safety oversight system to enhance aviation safety by monitoring and evaluating aircraft operators / service providers' compliance with applicable regulations, procedures and recommended practices. This should be achieved through a combination of activities, including security audits. Such safety audits by the regulatory body should have a broad overview of the safety management procedures of the auditee. Key issues in such audits should be:

- Safety management - Ensure that the organization's SMS is based on sound principles and procedures and that the organization is meeting its safety objectives;

- competence - the audited organisation should have adequately trained staff for all safety related positions;

- areas and degree of risk - the audit should assess how risks are identified and how necessary changes are made to ensure that all safety standards are met;

- oversight and compliance - the body must ensure that international, national and local standards are met prior to the issuance of any license or permit, and continue to be complied with thereafter.

ICAO Document 9734-A - The Establishment and Management of a State’s Safety Oversight System defines Eight Critical Elements of a State’s Safety Oversight System - as shown in the Fig. 3.3:

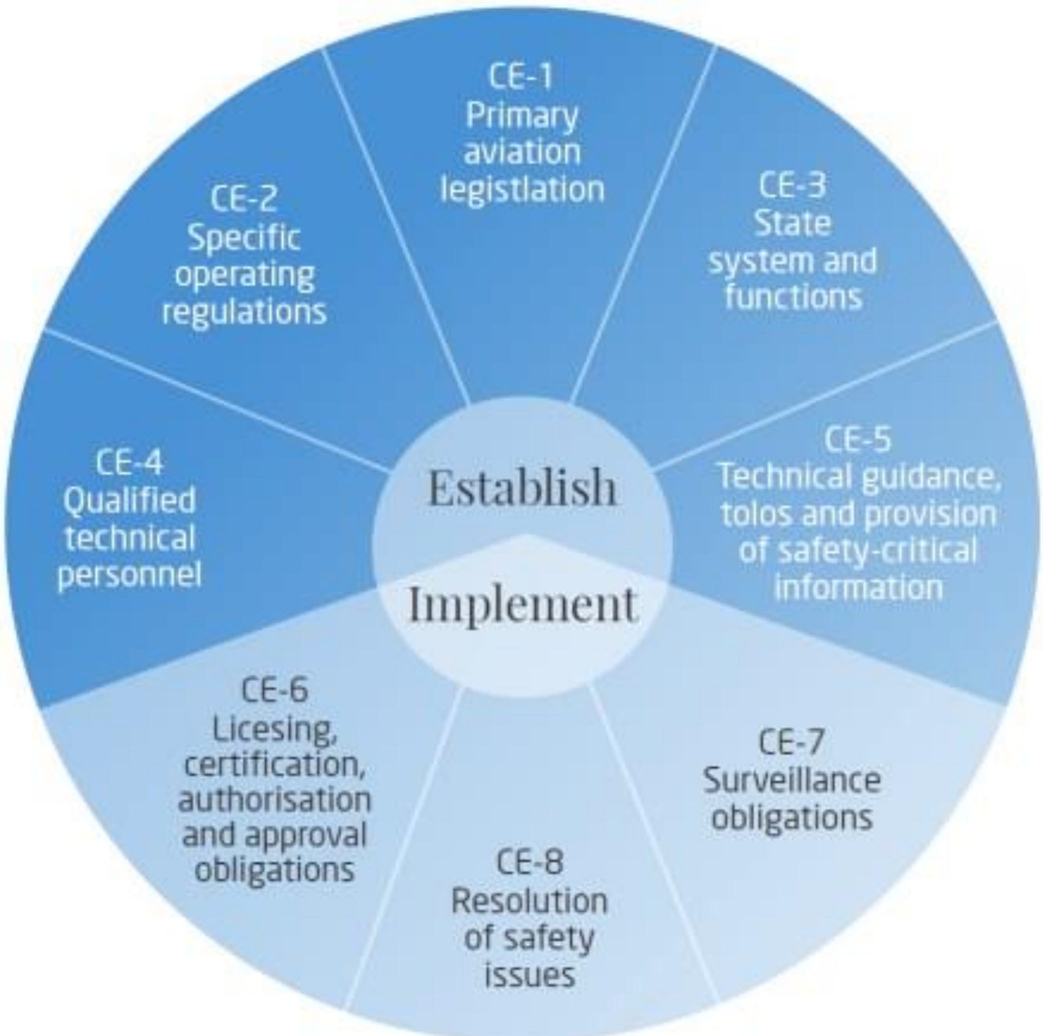

Fig. 3.3 - Eight Critical Elements of a State's Safety Oversight System

Ideally, government regulators were supposed to have established procedures and criteria for inspections of concentration, audit and surveys (in the annual audit program) on these areas of high concern or the need for security, as determined by the analysis of these operational data and risk areas. Regulatory audits do not depend on internal audit activities carried out by an interested organization as part of its SMS. Security audits are an important security tool for international and national regulatory authorities and supervisory authorities.

3.6.2 Third Party Audits (external auditing)

An organization's management or regulatory body may instruct a third party agency to conduct a stand-alone safety audit. indicates that: “External audits of the SMS may be conducted by significant bodies able to confirm that the service provider

SMS. Moreover, the audit can be conducted by industry associations or other third parties selected by the service provider. These external audits improve the internal audit structure as well as provide independent oversight. ” An organization with the fundamental ability and technical experience to demonstrate, for the benefit of a public authority, that an air navigation services provider has met the appropriate administrative requirements is called an organization qualified object. An organization seeking a Qualified Substance must be certified by a Government Official with an understanding of the Regulation on the Provision of Services (SAR).

3.6.3 Internal Safety Audits (self auditing)

In accordance with ICAO Doc 9774 - Manual on Aerodrome Certification, the aerodrome operator is required to arrange for an aerodrome SMS audit, including the inspection of aerodrome facilities and equipment. To conduct such a large-scale security audit, “the aerodrome operator should also arrange for an external audit to evaluate aerodrome users, including aircraft operators, ground handling agencies and other organizations” operating at the aerodrome.

Aviation service providers should use internal audits and safety surveys to assess the level of compliance with applicable regulatory requirements and organizational SMS processes and procedures, to verify the effectiveness of such processes and procedures, and to determine corrective actions, if necessary.

When planning audits, the safety significance of the processes to be audited and the results of the audit should be considered previous audits. The annual audit program should include:

- definition of the audits, in terms of criteria, scope, frequency, and methods;
- description of the processes used to select the auditors;
- the requirement that individuals shall not audit their own work;

• documented procedures for assignment of responsibilities, planning and conduct of audits, reporting results and maintaining records;

• audits of contractors and vendors.

3.7 Flight safety integrated management system

The Safety Integrated Management System (FSIMS) brings together all the points of view of the structures, forms and standards of the organization into a single intelligent structure. This merger allows the company to simplify management, save time and increase productivity by covering all components of the overall management system. A successful FSIMS eliminates the unnecessary hassle and work of numerous administrative frameworks. For example, instead of auditing each Standard, you kind of should be auditing it. FSIMS allows these processes must be combined in such a way that they simultaneously cover all the specific requirements of the Standard. In fig. 3.4 below is an enterprise-wide safety culture:

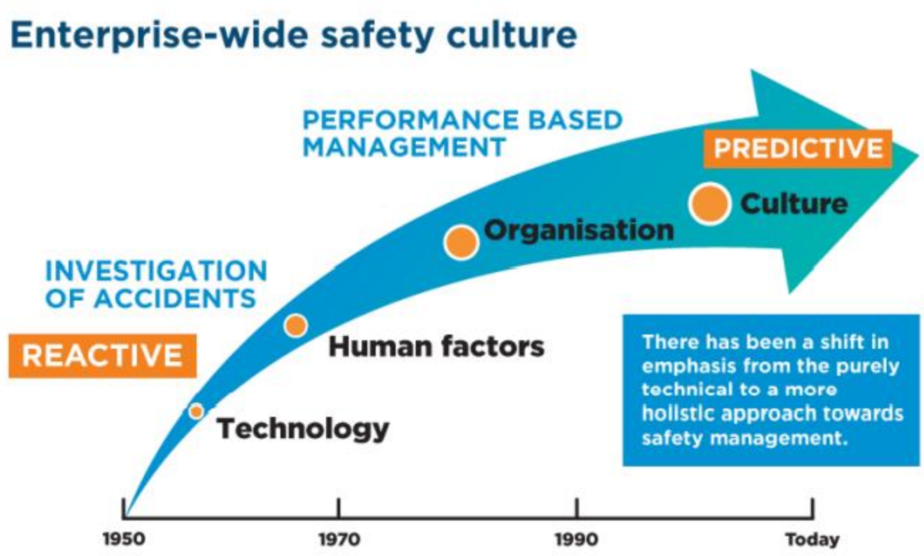

Fig. 3.4 – Enterprise-Wide Safety Culture

So what does the FSIMS cover? FSIMS strives to integrate various elements of operations into a “system of systems”, providing a holistic approach to manufacturing excellence. Events can affect several aspects of a business - everything is interconnected. A safety event can have implications for quality, environmental impact and risk. IAMS strives to provide a complete picture of all these elements:

• Safety Management System: handling the overall safety reporting and occurrence tracking of events within the organization. Safety events are recorded, investigated and findings are reported. • Security Management Systems: ensuring that all security protocols are followed, proper controls and measures are put in place, and all aspects of the operation are secure and safeguarded.

• Quality Management Systems: quality of the processes and equipment is of paramount importance to an airline. It is important to make sure that processes are managed and events related to quality are corrected and improved.

• Enterprise Risk Management: mitigating risk and identifying hazards is at the core of any organization, let along air carriers. Risk Management takes a top-down approach to risk and identifies all the potential hazards and harms within the organization and seeks ways to mitigate those risks.

• Supplier Management Systems: managing safety, risk and quality within the organization is important, but so too is managing these factors in the supply chain. With all the suppliers the airline industry employs, it is important than suppliers are monitored and tracked, logistics are managed, and supplier compliance is maintained.

• Environmental SMS: environmental impact is one of the core tenets of IATA, and airlines are held to a high standard of environmental risk mitigation. That, coupled with occupational safety of employees make having an ESMS a critical component to the FSIMS.

CONCLUSION

The voluntary reporting system is a wise and highly intelligent system. Based on the fact that it is made anonymous, airlines and any aviation enterprises can eliminate their shortcomings and shortcomings in the shortest possible time. With the help of this system, there will be fewer aviation casualties, aviation accidents of any kind, incidents and just any threats to human health.

An audit system is also mandatory, as any system or organization must be monitored to maintain and / or improve security.

Threat identification and risk assessment are an integral part of not only flight safety, but aviation security in general. The first two topics are very broad and may even have separate and independent divisions, while safety is fundamental and fundamental.

But aviation, especially civil aviation, must not only be safe, so we can also face such a factor as the airworthiness of an aircraft. Aircraft airworthiness is an extremely important part of both the aircraft itself and safety itself. This certificate confirms that the aircraft is fully operational, suitable and safe for the transport of goods and people.

4 TARGET INDICATORS

4.1 Target indicators definition and description

The minimum level of civil aviation safety in a State, as specified in its State Safety Program, or at a benefit provider, as specified in its SMS, is reported in the form of safety targets and safety markers.

An acceptable level of safety must be established by the State.

Absolute safety is generally an unattainable and very costly goal. Over-allocating security resources can make it impossible to make any changes. On the other hand, neglect of safety measures can lead to accidents. Therefore, the concept of safe space has been adopted in aviation. The term "safety space" describes the area in which both protection (safety) and performance (performance) objectives are achieved. This approach is also applicable to the government's management of its State Security Program (SSP), given the requirement to balance the resources required for government protective functions, including certification and surveillance. For SSP purposes, targets are defined and set by the State's aggregate safety indicators. For this purpose, state flight safety indicators are used, which include objective objectives and warning parameters. Therefore, it is an overarching concept, while safety performance with associated warning levels and target levels is actual performance. The result of safety management processes is “to promote the achievement of an acceptable level of safety with a balanced allocation of resources between production and protection". ... Traditionally, in many industries, including aviation, safety regulation is prescriptive, that is, the regulator defines the rules and standards to be followed and uses audit and inspection to verify compliance. This approach requires significant resources from the regulatory body and is often overly restrictive for the regulated entity, especially when introducing new processes and technologies.

Target indicators are expressed by two specific metrics, namely safety targets and safety indicators. Safety metrics are tactical monitoring and measurement tools, while targets define the long-term safety objectives of the GASP.A fully developed ALoSP monitoring and measurement process:

- identify all the safety-critical sector and the safety indicators that define the level of safety in these area;

- identify targets that define the level to maintained or desired improvement to be achieved for relevant indicators in each sector;

- identify alerts that will indicate an actual or developing safety performance problem in a particular safety indicator or sector;

- re-view SSP safety performance to determine whether modifications or additions to existing indicators, targets or alerts are needed to achieve continuous improvement.

4.2 Target indicators as per Global Civil Aviation Statistic

The Organizational indicators are presented ib the Table 4.1:

Table 4.1 – Organizational

Objectives	Indicators	Metrics	Target of 2020		
Serious incident	Airfase, reports	Rate per 1000FH	<0.07	0.07-0.13	≥0.14
Incident	Airfase, reports	Rate per 1000FH	<0.92	0.98-2.7	≥2.7
Bird strike	Reports, inspections	Number per year	<10	11-14	≥15
Compliance with IOSA Standard	Result IOSA audit	Percentage of Effective Implementation	98-100%	94%-99%	<96%
Reporting culture	Increase the voluntary reporting rates from each operational area	Number of reports	≥190	140-200	<150
MCAA audit	Result of audit	Number of finding	<5	6-9	≥10
		Number of observation	<15	17-20	≥20
Emergency response	Emergency drills	Number per year	≥3	2	<2
SMS	SMS training	Number per year	≥15	10-13	<10
	Action group meeting	Number per year	>19	17-20	<15

The Dispatch indicators are presented in the Table 4.2:

Table 4.2 – Dispatch

Objectives	Indicators	Metrics	Target of 2020		
Increase Flight Operation Safety	Voluntary report	Number and rate of report received	>20	15-19	<15
	SMS Training	Training completing Training quality	100% 80%	80%-99% 70%-79%	<80% <69%
	Internal audit result	Number of nonconformity	0 significant <2 insignificant	0 significant 2-3 insignificant	>1 significant >3 insignificant
	External audit plan	Number of nonconformity	0 significant <2 insignificant	0 significant 2-3 insignificant	>1 significant >3 insignificant
Aeronautical data quality	Flight Operations Bulletins	Number of flights operateed without relevant bulletins or notifications to crew	Significant operational impact		
			0-2	3-4	>4
			Insignificant operational impact		
			0-12	13-25	>25
Reduction of occurrence relevant to flight operations irregularity	Operational Flight Plan	Number of non-complience	0	1-2	>2
		Number of irregularity	0-2	3-4	>4
	NOTAM	Number of irregularity	0-2	3-4	>4
	Weight and balance	Number of irregularity	0-2	3-4	>4
	Diversions	Number of diversions due to weather	0-8	9-14	>14
	Deviations	Deviations of PIC decisions compared to information provided be Aircraft Dispatchers	<5	6-10	>10

CONCLUSION

Targets are the level that any airline must adhere to. Each airline has its own targets, the more serious and develop the airline is, the tougher its tasks.

5 MAINTENANCE ORGANIZATION STAFF OPTIMIZATION

5.1 Maintenance organization characteristic and description

The maintenance of the aircraft is part of the technical activities of the aircraft performed on the plane, while it remains in the line or base service environment. Maintenance of the aircraft is intended to maintain an aircraft in the condition in which the approval certificate will be issued or authorized. Angar medium can be available, but often not needed. Causes of service are summarized:

• keep the aircraft in service - readiness which is of key importance to the operator, i.e. the aircraft can meet its schedule;

• aircraft safety – airworthiness at his heart;

• maximise value of asset (airframe, engine and component) – of prime importance to the owner or lessor.

Maintenance consists of a combination of prophylactic and corrective work, it also includes prevention to ensure and obligate that random failures are not detected. In addition to:

• scheduled or preventive work to anticipate and prevent failure;

• unscheduled work – Repair maintenance and on-condition maintenance.

Typical Maintenace Organization Scheme is illustrated on Fig. 5.1:

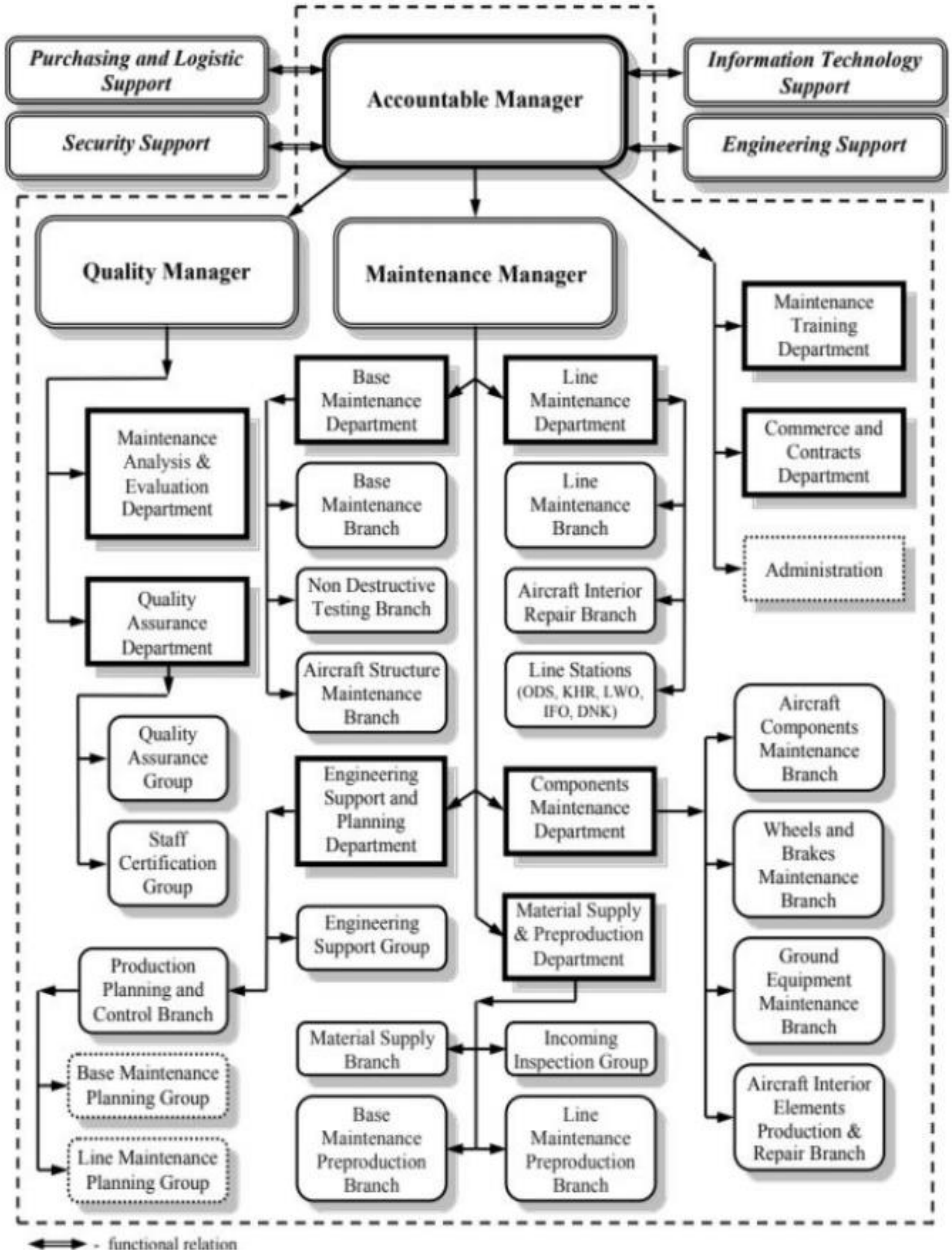

Fig. 5.1 – Typical Maintenace Organization Scheme

5.2 Line maintenance

This typically includes pre-flight checks, daily (pre-first flight) fluid checks, troubleshooting, and the following minor scheduled maintenance. According to EASA Part 145, line maintenance is to be understood as “any maintenance that is carried out prior to flight to ensure that the aircraft is suitable for the intended flight”. This could include:

- schedule maintenance and/or checks including visual inspections that will detect obvious failures but do not require extensive in depth inspection. It may also include internal structure, systems and powerplant items which are visible through quick opening access panels/doors;
- component replacement, up to and including engine and propellers, with use of external test equipment if required;
- trouble shooting;
- defect rectification;
- minor repairs and modification which do not require extensive disassembly and can be accomplished by simple mean.

5.3 Heavy maintenance

Basic maintenance can be called heavy (or deep) maintenance and consists of tasks that are generally deeper and more lengthy than those listed above, but are performed less frequently. Accompanying organization (maintenance, repair and overhaul)

The company must have large premises, specialized equipment and personnel to perform basic maintenance, and many operators take on this function under contract. Various activities may include:

- C and D Checks (block checks see Maintenance Programme) which will check for deterioration of the airframe, engine and system, e.g. corrosion, fatigue;
- removal of defect – implementation of Service Bulletins (SB) and Airworthiness Directives (AD), although this can also be done during Line maintenance;
- technology upgrade – fitting of Terrain Avoidance and Warning System (TAWS), Airborne Collision Avoidance System (ACAS) etc;
- cabin reconfiguration, paint etc.

5.4 Certifying/Support staff lists

Certifying / Supporting Personnel Lists identify all Certification and Support Service Organizations that hold the following maintenance licenses for Part-66 aircraft or their international counterparts:

Part-66 Licenses:

- category A;
- category B1;
- category B2;
- category C.

Certification personnel responsible for the release of the aircraft or its components after maintenance and support for personnel confirming with its signature, the work is responsible for the fact that the whole job specified in the release of the service document or workplace is performed correctly, executed correctly, That's right, fully and technical documentation is properly compiled.

5.5 Mechanic qualification

The following qualifications exist for aircraft maintenance:

- Unskilled Worker (UW);
- Qualified Mechanic (QM).

Qualified personnel holding the maintenance organization qualifications «QM», «QMI» and «QSM» are responsible for the correct and entire performance of their relevant maintenance task(s) and signing of it in production documentation. Qualified Mechanics (QM, QSM) work under the supervision of an appropriate Certifying/Support staff. This means that:

- the mechanic is assign to a specific Certifying/Support staff at any time;
- prior to commencing the work, the mechanic shall ask, and the Certifying/Support staff shall instruct: a) which task(s) the mechanic shall perform; b) which special instructions, (pre)cautions and/or warnings apply if any; c) at what stage(s) the mechanic shall stop the work for inspection by the AME before proceeding;
- the mechanic shall report to the Certifying/Support staff: a) any question or uncertainty he may have regarding being able to properly completing the task(s); b) any mistakes requiring rectification to reestablish required maintenance standards; c) completion of the work; d) details for work hand-over, as and if applicable.

5.6 Exchange of A, B and C categories part on Unskilled-Worker

The main idea behind staff optimization in the service organization is to reduce the number of workers with A, B, and C licenses to reduce costs for the service organization. But at the same time, increase the number of workers with the position of unskilled worker, which, in principle, does not change the number of workers in the service organization, but at the same time reduces the number of worker-inspectors (Categories A, B, C). As practice shows, workers with licenses A and B can often do the job like a QM worker, which is a bit inappropriate in terms of airfreight costs. A good source of new unskilled workers are graduates of the National Aviation University or 5th year students who already have basic tertiary education and are still in graduate school degree. These people also need work and want to build a career. Apart from the low wages compared to grades A, B and C, these are fresh heads with a lot of ambition and enthusiasm, which will benefit their job at the airline. New people need to be trained of course, but after a while it will work. Let's leave all three categories of QM mechanics unchanged. Let's leave all three categories of QM mechanics unchanged. Let's leave all three categories of QM mechanics unchanged.

In the Table 5.1 illustrated the principle of selection new people into job:

Table 5.1 – Job Selection Factor

Job selection factors	
Language	Intermediate or higher level
Education	Higher basic education
Personal quality	Responsible Disciplined Clever
Knowledge	High

And in the Table 5.2 We want to represent the difference between present staff in some maintenance organization and suggested one:

Exchange of staff	
Aviation Fleet Company: MI-8	
Present staff: A category – 25 workers B1 category – 15 workers B2 category – 10 workers C category – 6 workers Unskilled-Worker – 25 workers Costs per year – 135 000 USD	Suggested staff: A category – 15 workers B1 category – 8 workers B2 category – 5 workers C category – 3 worker Unskilled-Worker – 35 workers Costs per year – 114 000 USD
Money saving is 21 000 USD per year	

CONCLUSION

Consists of periodic inspections of the technical condition of the aircraft, which must be carried out by the service organizations after the expiration of the established calendar time or the established taxation adopted by the airline using the aircraft.

There are the following types (forms) of maintenance: transit check, daily check, weekly check, A-check, B-check, C-check and D-check.

A-check and B-check are simple checks, while C and D-check require serious maintenance.

If the airline operates only on daytime flights, then it is advisable to carry out maintenance at night. Redistributing work between nocturnal forms can ideally rule out moderate forms (A-check).

6 LABOR PRECAUTION

6.1 Introduction

This work is based on the work of aviation personnel Aviation mechanic is a high-danger profession, to which extra labor protection requirements are imposed, include special requirements for theoretical training, practical training, certification, admission to independent work, training in occupational health and safety, periodic test of knowledge, profession and labor, safety. At the workplace of an aircraft mechanic, there are many places that can cause harm to a person, both mechanical and chemical.

6.2 Analysis of working conditioning

The mechanics work in hangars that demand a certain physical activity associated with this activity. They can operate outdoors at any time of the day or night and at any time of the year. There are potential hazards associated with working with aircraft, electricity, compressed air, hydraulic systems, acids, paint, hand and power tools, solvents, lubricants and other flammable materials (aviation fuel).

Maintenance and repairs require different types of tools and complexity. There is some potential for moderate injury from the equipment, therefore proper tool use and safety precautions must be observed. It is necessary to wear protective clothing, goggles and a face mask, special shoes.[1]

6.2.1 Workplace organization

The maintenance hangar is designed for 3 helicopters at a time. The total area of the hangar is equal to:

$$A=a*b\ [m^2]$$

$$A=80*60=4800[m^2],\text{ where a-length, b-width}$$

The hangar has a warehouse with tools, storage space for attachments and equipment for working on the ground.

The hangar is equipped with ceiling lights, windows and a main gate. There is also an electrical network for connecting aircraft : 220V, 50Hz, 27V 40 Hz, 115V, 400Hz, there must be constant ventilation, a heating, humidifiers and air conditioning system. The temperature should be 18-22 ° C, humidity 30-60%.

And the most important thing is a fire extinguishing system, both general and local (hand-held fire extinguishers).[1]

6.2.2 The list of harmful and hazardous factors

Dangerous and harmful production factors by the nature of the action are divided into the following groups [2]:

- factors due to the mental and physiological properties and characteristics of the human body and personality of the employee (poor health of the employee, the presence of the employee in a state of alcoholic, drug or toxic intoxication or abstinence, loss of concentration due to employees, etc.);
- factors generated by behavioral reactions and defense mechanisms of living beings (bites, stings, release of poisonous or other protective substances, etc.);
- factors caused by socio-economic, organizational and managerial conditions of employment (poor organization of work, low safety culture, etc.);
- factors caused by the biological properties of microorganisms located in biological objects and (or) polluting material objects of the production environment;
- factors cause by the physicochemical and chemical properties of substances and materials used or locate in working area;
- factors due to the physical properties and characteristics of the state of material objects of the production environment;

Physical hazards and harmful production factors

- increased level of vibration;
- increased level of noise at the workplace;
- high or low air temperature in the working area;
- increased or decreased temperature of surfaces of equipment, materials;
- increased dust and gas content of the air in the working area;

6.2.3 Analysis of harmful and dangerous production factors

Factors which belong to physical harmful factor a dangerous [2]:

- insufficient lightning of the working area;
- inappropriate organization of the workplace;

• increase noise level;

• reduced ionization of air;

• increased level of static electric;

• short-circuiting of which can occur through the human body; high level of electromagnetic radiation;

• voltage level in the electrical circuit;

6.2.3.1 Microclimate of the workplace

Temperature is of great importance when servicing aircraft in a hangar, since at low or high temperatures the properties of metals change, which can negatively affect the quality of service [3].

	Optimal	Actual
Temperature, C^o	18-22 C^o	23 C^o
Humidity, %	35-50%	40%
Air velocity, m/sec	0.1-0.5 m/sec	0.2 m/sec

Table 4.1 Microclimate characteristics

Table 4.1 shows the climatic data to be adhered to in accordance with the instructions of ICAO or local authorities. The temperature in this room has been slightly elevated, which could lead to an error. To improve the temperature, you need to check the air conditioning system, if there are problems, eliminate them, use humidifiers to improve humidity.

6.2.3.2 Noise level at the workplace

In factories where machines and other equipment are located in the shops, noise is usually insufficient. The continuous technique produces loud sounds that can vary in intensity.

If a person is forced to regularly be exposed to such effects, then this will negatively affect his health. From a strong noise, the head begins to ache, the pressure rises, and the hearing acuity decreases.

In the end, such conditions reduce working capacity, fatigue appears, attention decreases, and this can already lead to an accident [3].

The leaders of such enterprises must take care of their employees in order to at least slightly reduce the negative impact of noise on the body. To this end, the enterprises eliminate these factors as follows:

- Finishing of premises with sound-absorbing materials.
- Provide soundproofing of noisy places with the help of protective covers and booth equipment.
- Personal protective equipment such as earmuffs, earplugs, helmets.
  - Sound attenuators.

6.2.3.3 Exposure to vibration and its elimination

Vibration is included in the list of harmful production factors. It can be divided into categories[3]:

- by the time of exposure: temporary and permanent.
- in the direction: vertical and horizontal.
- by the method of transmission: general and local.

As a result of constant exposure to this factor, not only the nervous system begins to suffer, but also the musculoskeletal system and the analyzer. Workers forced to work in such conditions often complain of headaches, dizziness, motion sickness.

If we also add the influence of concomitant factors, such as humidity, high temperature, noise, then this will only increase the harmful effects of vibration.

To protect yourself from it, you can suggest the following measures:

- installation of the units on a solid foundation.
- the use of soft surfaces on vibrating parts of devices or equipment.

• replacement of equipment with a more technologically advanced one.

6.2.3.4 Illumination of the workplace

The ability of workers to perform various types of maintenance and inspection work is highly dependent on adequate lighting in their work areas.

In the aviation service, proper lighting is especially important. Most of the scheduled maintenance work is done in the hangar at night. Light intensity is measured in lux, which is the metric equivalent of a foot candle (ft-s). Each foot candle equals approximately 10 lux. The level of lighting that is considered “adequate” depends on the type of task being performed. To get an idea of the range of "adequate" lighting, consider the following[3]:

a) requires EXIT signs to be illuminated with at least 5 ft-c (about 50 lux) brightness.

b) Complex inspection tasks or precision bench may require lighting up to 500 ft-s (5000 lux).

In Fig. 6.1 shows recommendations to lighting

Lighting Levels

Lowest recommended level:	15-20 ft-c (150-200 lux)	Should be used only for infrequently used areas
Normal recommended level:	75-100 ft-c (750-1000 lux)	Adequate for many normal maintenance tasks

Fig. 6.1 Light level recommendations

More modern lighting elements can be used to create the desired lighting in the workplace, evenly spaced throughout the workplace. If the main lighting is not efficient enough, local luminaires can be used (from a conventional lamp to mobile lighting stations).

6.3 Solution to prevent the effect of noise level

The leaders of such enterprises must take care of their employees in order to at least slightly reduce the negative impact of noise on the body. To this end, the enterprises eliminate these factors as follows [3]:

- Finishing of premises with sound-absorbing materials.
- Provide soundproofing of noisy places with the help of protective covers and booth equipment.
- Personal protective equipment such as earmuffs, earplugs, helmets.
- Sound attenuators.

To reduce structure-borne noise propagated in solid environments, sound and vibration insulation floors are used. Oscillations propagating through communications (pipelines, channels) are weakened by attaching the latter through sound-absorbing materials (rubber and plastic gaskets). In addition to soundproofing, sound-absorbing agents are widely used in industrial environments.

Reducing noise can be achieved through a rational building layout: the most noisy rooms should be concentrated in the depths of the territory in one place.

6.4 Fire safety of production facilities

Technological equipment in normal operating conditions must be fireproof, and in case of dangerous malfunctions and accidents it is necessary to provide protective measures to limit the scale and consequences of the fire.

For all substances and materials used in technological processes must be data on indicators of their fire hazard in accordance with НАПБ А.01.001-14. .Fire and explosion hazard of substances and materials. Nomenclature of indicators and methods for their determination."[4].

The fire hazard characteristics of the substances and materials used or produced (received) must be studied with the service personnel. Personnel are obliged to comply with the requirements of markings and warning labels on the packaging or in the instructions for their use when handling flammable and explosive substances and materials.

Joint use (if not provided by the technological process), storage and transportation of substances and materials that as a result of interaction with each other cause ignition, explosion or form flammable and toxic gases (mixtures) are prohibited.

Signs prohibiting the use of open flames, as well as signs warning of caution in the presence of flammable and explosive substances, in accordance with ДСТУ ISO 6309:2007. Safety signs. Shape and color "(ISO 6309: 2007). Signal colors and safety signs "[5].

Organizational and technical measures must include:

- Organization of a fire-fighting service (in the appropriate order) of the appropriate type (professional, volunteer, etc.), number and technology;

- Certification of substances, materials, products, processes and facilities in the field of fire safety;

- Involving the public in the fire safety point;

- Training of workers, employees, students and the public in fire safety policy;

- Development and implementation of fire safety norms and rules, instructions on fire hazardous substances and materials, adherence to the fire regime and human actions in case of fire;

- Development of measures for the actions of the administration, workers, employees and the population in the event of a fire and evacuation of people;

- Manufacturing and application of propaganda equipment to ensure fire safety.

Categorize room made taking into account indicators fire danger explosive substances and materials, there are used and their quantity. НАПБ А.01.001-2004 the rules of fire safety in Ukraine . According to the following document explosion and fire hazard are divided into five categories (A, B, C, D):

• Category A. Combustible gases, flammable liquid with a flashpoint not exceeding 28 ° C in a quantity that can form explosive mixtures vapor gas air, which develops flash at rated overpressure blast in the room, which exceeds 5 kPa. Materials and substances that can explode and burn in contact with water, oxygen, or with each other to such an extent that rated overpressure blast in the room more than 5 kPa.

• Category B. Combustible dust or fibers, flammable liquid with a flashpoint over 28 °C, and flammable liquids in a quantity that can form explosive mixtures Steam air dusty or, if flash which develops rated overpressure blast in the room, which exceeds 5 kPa. Combustible and heavy burn liquid, solid and heavy burn combustible substances and materials and substances capable in contact with water, oxygen, or with each other lit only on condition that the premises in which they are, or used, do not include categories A and B.

• Category C. Non-combustible substances and materials in the hot, hot or molten state, the processing of which is accompanied by radiant heat, sparks, flames; flammable gases, liquids, solids are incinerated or recycled as fuel.

• Category D. Non-combustible substances and materials in the cold. Select the type and definition of the required number of fire extinguishers depending on their extinguishing capacity, marginal areas, class fire flammable substances and materials in the room or on the protected object:

- Class A - fire solids, preferably organic origin, which is accompanied by burning decay (wood, textiles, paper);
- Class B - fires of flammable liquids or solids which melts;
- Class C - fire gases;
- Class *D* - fire metals and their alloys;

Class E - the fire due to burning electrical installations.

6.5 Safety meauses

They are primarily aimed at ensuring that harmful production factors do not have a dangerous effect on humans.

For this, safety training must be carried out at any enterprise without fail. The date and content are recorded in a special journal signed by all instructors and the person who conducted the training.

In total, there are several types of such work:

- induction training. It is carried out without fail with hired persons. Here, neither age, nor experience or position matters.
- primary. It is carried out already at its workplace, it is usually carried out by a foreman or the head of a given department or workshop.
- repeated. It is held for all employees without exception every six months.
- unscheduled. Unscheduled instructions conduct if:
- the rule have changed.
- the technological processes has changed.
- have purchased new equipment.
- cases of violation of safety rule by workers were identified.
- after long break in work.

Very often, in practice, you can find a situation when workers simply give to subscribe to safety logs without instruction. This is simply unacceptable. Any accident in this situation will completely fall on the conscience of such careless leaders who work only for show.

CONCLUSION

Occupational safety and health should not be sidelined as a service delivery issue. The health and wellbeing of the healthcare professional is a must-have perspective on employee inspiration and performance, which impacts efficiency as well as maintenance. The safety of the health professional also affects the quality of care; The care of the caregiver should be the concern of the health care system. What is good for worker health is sweet for restful health.

7 ENVIRONMENTAL PROTECTION

7.1Allowance of aviation to global climate change

The most common environmental impacts from operational changes : noise, fuel consumption and greenhouse gas emissions, air quality, although other impact areas may be conside at national or local level.

Some States have a set list of parameters that will be used in a logical evaluation,and it is useful to get acquainted with them to ensure that all current compulsory.

Indicators are included in the research system. The purpose of the proposed change will be also help us determine the parameters for consideration, especially if the offer is aimed at solving existing environmental problem. Special attention should be paid to identifying interdependence of environmental and non-environmental nature to ensure that any compromises adequately reflected in the study. This section provides an overview of possible options to consider.

7.1.1 Air quality

The combustion of aviation fuel creates various air pollutants in the form of gas and particles emissions, which can affect air quality and human health. As a rule, the following common varieties differ when assessing air quality:

- VOC - volatile organic compounds (including non-methane hydrocarbons (NMHC));
- CO is carbon monoxide;
- SOx - sulfur oxides;
- NOx - nitrogen oxides, a mixture of nitrogen dioxide (NO2) and nitrogen oxide (NO);
- PM - particulate matter, with the most problematic being particles, aerodynamic the diameter of which is less than 10 μm (PM10) and 2.5 μm (PM2.5) 2.

These emissions may, in turn, can be building blocks of wider environmental problems associated with the Ozone of the Ground Level, photochemical, secondary aerosol particles and other chemical processes in the atmosphere with potential health effects.

Emission reserves should take into account additional types of emissions that can cause health problems and environmental problems, including so-called hazardous air pollutants (HAPS), well-known organic gases, which even at low concentrations may have serious health effects. At the date of publication of this document, the HAP study is at a relatively early stage, although some scientists have discovered up to 15 well-known Heights in the aircraft exhaust. It should be noted, however, that for many of these substances, knowledge of emission coefficients is very limited.

7.1.2 Fuel consumption and greenhouse gase

Airplanes emit huge amounts of carbon dioxide and water vapor, nitrogen and soot oxides into the atmosphere. The environmental impact of these components depends on the height of the flight. Look at the Fig. 6.1 that illustrates emissions:

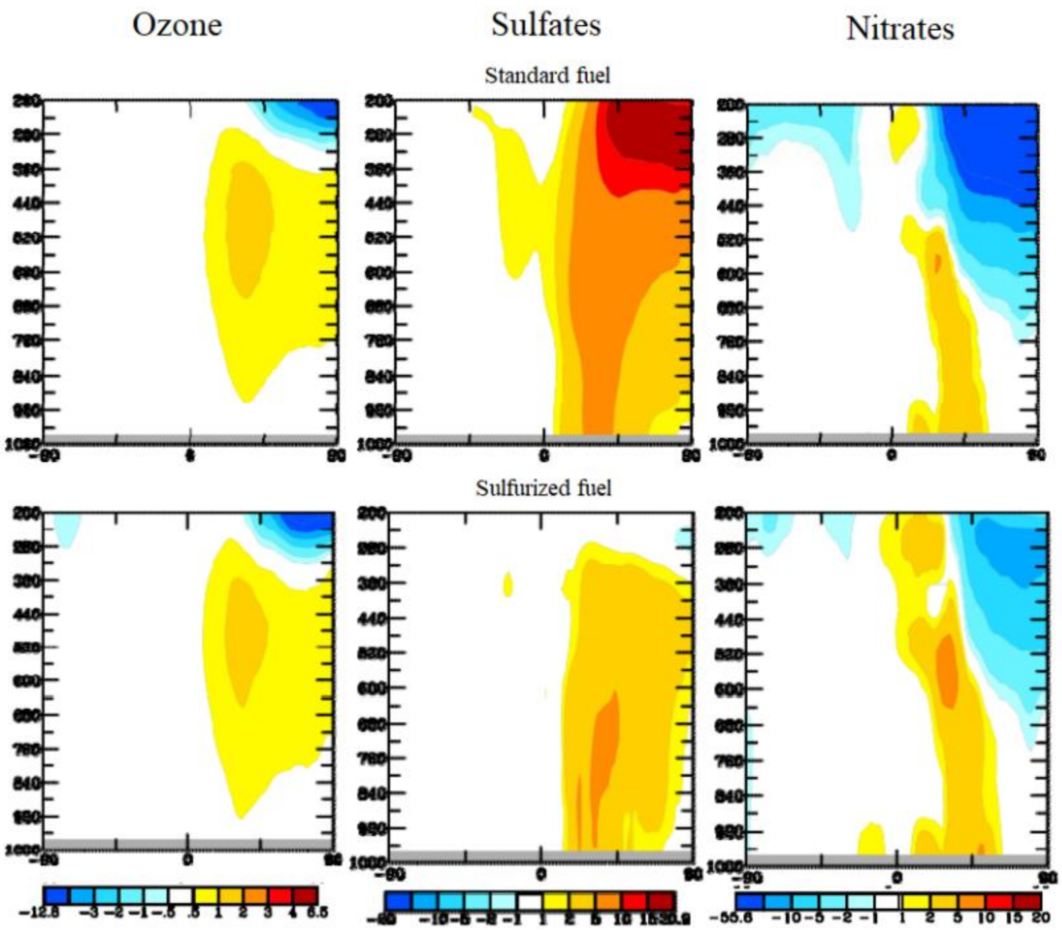

Fig. 6.1 – Airplane Emissions

The fact that aircraft pollute the environment with their exhaust gases is obvious and no doubt. Yes, any economic activity of a person damages nature and contributes to climate change. The only question is how great is the contribution of one species or other to this common process.

So, according to Professor Ulrich Shuman, director of the Institute of Atmospheric Physics of the German Aerospace Center, aviation is about 3% percent of the entire anthropogenic greenhouse effect. I have to say that not all experts agree with this assessment. That is quite natural, because this figure is very approximate, partially even speculative.

In the end, the exhaust gases of the aircraft contain carbon dioxide, vapor, nitrogen oxides and accurate carbon black. All of these components have an ambiguous and sometimes multidirectional effect on the environment and climate of the planet.

7.1.3 Carbon dioxide is distributed evenly

The fact is that aviation fuel - kerosene is a complex mixture of hydrocarbons. Carbon is 86 percent of this, hydrogen is 14 percent. If the carbon is burned with oxygen in the air, so that every kilogram of emergency kerosene gorors adds a 3.15 kilogram of carbon dioxide to the atmosphere. "Since carbon dioxide is a very stable substance, it is evenly distributed worldwide," says Professor Schuman.

In addition, CO_2 easily migrates in the vertical direction, so whether it was formed near the surface of the Earth or at an altitude of 10-11 thousand meters, where most of the runs on civil aviation corridors do not play any role. Therefore, it is easy to calculate that approximately 2.2 percent of the entire anthropogenic carbon dioxide is released into the atmosphere by aircraft. Road transport accounts for about 14 percent, other types of transport - sea, railway and others - produce by 3.8 percent.

The duration of emissions is significantly varied from carbon dioxide, which continues in the atmosphere for a long time, to a water pair, which has a relatively short lifespan. Modern gas turbine engines emit almost no nitrogen oxides (N_2O), as well as emissions of moderate methane (CH_4), when the engines work with the smallest economic modes, it was not observed at other stages that methane emissions were not observed at other flight stages.

7.1.4 Influence of the condensation trail on the height

It is much more difficult to assess the role of water vapor emitted by aviation. That is, a quantitative assessment is not difficult: it is known that when one kilogram of kerosene is burned, 1.23 kilograms of water vapor are formed. But with a qualitative assessment, the situation is more difficult. When hot and wet exhaust gases are included in the cold medium, steam condensates that form the smallest droplets of water, and at high heights, where the outdoor temperature reaches 30-40-50 degrees below zero, the smallest ice floes. These droplets and ice floes are sometimes clear from the ground - in the form of the so-called condensation trace, tightening the plane. How this mind affects the atmosphere depends on the height of the flight.

"The troposphere is the bottom, very turbulent layer of the atmosphere, in which the weather is formed," Professor Schumann explains. Layers that are not mixed with each other. "

7.1.5 Water vapor in the stratosphere and troposphere

In the stratosphere with its extremely low moisture content - less than 0.01 ppm - ice traces evaporate quickly. But in the troposphere, where air masses can be saturated to moisture limit, the condensation track behavior depends on many weather factors' factors, says that Professor Schumann: "If the air humidity is high, ice crystals absorb additional water, condensing trails can form zirrus clouds. They contribute to the further condensate of moisture from the air, as a result, as a result, the density and water content in the clouds increase. "

This development of events is observed in 10-20 percent of cases. In other words, air transport really increases cloudy on our planet, - emphasizes the scientist. True, the question here is appropriate: is it good for climate or bad? On the one hand, the clouds reflect some of the shortwave sun rays back into space. "Simply put, the traces of condensate throw a shadow on the ground, and she is steeper in the shade than in the sun," Professor Schumann explains. On the other hand, ice crystals in such clouds absorb the long wave of infrared radiation, and then send some of this heat to the ground. There are two oppositely directed effect, and experts can’t say for sure that they prevail, although most experts tend to believe that heating is still somewhat stronger than cooling.

7.1.6 Influence of black carbon

Another factor that affects the environment and climate of the planet is herself in the form of a thin dust. The diameter of the soot of particles in exhaust airplanes ranges from 5 to 100 nanometers. It is clear that this dust, barely introduced into the atmosphere, contributes to the formation of condensate path, since part of the water vapor emitted by the aircraft, simultaneously with the soot it settles on it. And moreover, soot particles can remain in the air for weeks in the suspension, contributing to the formation of clouds. However, particles of dust of various origin, as natural (volcanic dust, desert dust, dust from soil erosion) and anthropogenic (emissions from industrial enterprises), and, moreover, drops of liquid droplets of various nature participate in the same processes.

In such a situation, it is extremely difficult to assess the effect of soot in general, and even more, soot emitted by the aircraft. According to Professor Shumanan, the German Aerospace Center examines the impact on the environment, say, soot particles emitted to the atmosphere during large forest fires. However, the results were very controversial. Even the question of whether the increase in or reducing cloudiness contributes to the very beginning, there is still no final and unequivocal response.

7.1.7 Influence of ozone on different heights

A separate topic is the effect of aircraft exhaust gases on ozone concentration into the atmosphere. As you know, the combustion chamber of the modern aircraft engine can heat up to 2000 degrees. "At such temperatures of nitrogen in air in the air in free state, it is binding to oxygen, forming oxides NO and NO2," explains Professor Schumann, "However, these oxides have a multipurpose effect on the ozone atmospheric: at high heights they decompose it, with a low height - form ".

The decomposition of ozone prevails at the heights of more than 16,000 meters, but ordinary civil airplanes do not fly there. Their corridors are located below 12 thousand meters, and nitrogen oxides cause active ozone formation. Unfortunately, this so-called tropospheric ozone enhances the greenhouse - just as carbon dioxide or water vapor. In addition, high levels of ozone in the air have a negative impact on health. And this ozone has nothing to do with the ozone layer in the stratosphere, which protects our planet from rigid ultraviolet radiation. In other words, the ozone hole above Antarctic can’t be fixed by the exhaust.

7.1.8 Dangerous substance emissions (calculation)

GTD are stationary organized sources of hazardous substance emissions in the atmosphere. During the preparation and monitoring of implementation, protection plans are provided for operating on gas industries, carboniser emissions (CO) and nitrogen oxides (NOX).

The mass of hazardous substances in the area of the compressor station for the three operating HPA in the nominal mode is calculated as follows:

1. We accept working hours in the nominal mode for the year:

$$t_H = 270 \text{ day} = 6480 \text{ h}.$$

2. Determine the mode of operation of the engines in the regime ranking:

$T_H = t_H\, n$,

where n is number of operate unit (n=2),

$T_H = 2 \cdot 6480 = 12960$ h.

3. Determine the mass of the fuel consume by the device during the operating period:

$GT = GT_{пит.} R_H T_H$,

where $GT_{пит}$ = 0,183 kg/(kWt•h) -– specific fuel consumption on nominal mode, kg/h.

R_H = 6,3 МВт. – unit power on rated mode (accord to the technical characteristic of the engine).

$G_т = 0{,}183 \cdot 6{,}3 \cdot 12960 = 14941$ kg/year

4. Calculation of the mass of Mi annual emission of carbon monoxide (CO), nitrogen oxides (NO_x), for HPA in nominal mode:

$M_i = к_i GT$,

where $к_i$ – emission factor of the i-th substance, when operate at nominal mode 83 (emission index), kg.speed / kg.fuel.

For carbon monoxide $к_{CO}$ = 0,0175 kg.sh/kg.fuel., for nitric oxide $к_{NOx}$ = 0,0125 kg.sh/kg.fuel. (indicators ki are take as average statistical data from run similar engine), than:

$M_{co} = 0.0175 \cdot 14941 = 0.261$ mSH/year

$M_{no} = 0.0125 \cdot 14941 = 0.187$ mSH/year

Extracted environmental and economic damage, which arises during the year due to emissions into the atmosphere, is determined for the source of pollution:

$Y = \gamma \cdot \sigma \cdot f \cdot M$ where Y– prevent ecological and economic damage (UAH / year); y –- constant, the numerical value of which is equal to 2.4; б – the value of which determine in the calculation; f – value, the value of which is determined in the following calculations; M – mass of the annual emission of pollutant from the source of pollutant is given.

For an organize source (exhaust pipe), height h> 10 m and area of activing pollution, which is circle with radius $z_{ЗАЗ}$ = 20 xh, C T x o 75 1 Δ = + , where x – dimensionless correction for the rise of the emission flare, calculated by the formula;

ΔT – the average annual value of the temperature equivalent at outlet of the source of pollution are equal to 150 C :

1,2 75 15 x =1,2

than $z_{ЗАЗ} = 20 \cdot 1{,}2 \cdot 10 = 240$ m.

The value of the relative risk of air pollution in the territory

Compressor station B = 4 (industrial territory).

The value of the Factor F (correction, taking into account the nature of the branching of impurities in the atmosphere) for gaseous impurities and light small particles, we assume that:

$$f = \frac{100м}{100м + x \cdot h} \times \frac{4\,\frac{м}{c}}{1\,\frac{м}{c} + U\,\frac{м}{c}}$$

where U – average annual value of wind speed module at weather vane level, m / s; in case where the value is unknown, it is taken equal to 3 m / s:

$$f = \frac{100}{100 + 1{,}2 \cdot 10} \cdot \frac{4}{1+3} = 0{,}89$$

The value of the reduce mass of annual emission of pollutant into the atmosphere from the source is determine by the formula: $M = A_i M_i$,

where M_i – mass of annualy emission of impurity of the i-th type t / year (for CO MSO = 0,392 t. SHR / year, for NOx - MNOx = 0,28 t. ShR / year.

A_i – indicator of relative aggressive of substance (for CO ACO =1): M_{CO} = 0,392·1 = 0,392 t.SHR / year. M_{NOx} = 0,28·1 = 0,28 t.SHR / year. Averted environmental and economic damage: Y_{CO} = 2,4·4·0,89·392 = 3349,24 UAH / year Y_{NOx} = 2,4·4·0,89·280 = 2392 UAH / year.

7.2 Reducing the impact of aviation emissions and greenhouse gases on the global climate

Montreal, March 6, 2017. The ICAO Council, consisting of representatives from 36 countries, adopted a new standard of emissions of the CO2 aircraft, which will help reduce the global effect of aviation greenhouse gas emissions. The CO2 aircraft emissions management measures contained in the new volume of III of Annex 16, environmental protection, represent the world's first global industry standard for the certification of building structures to regulate CO2 emissions. This standard will be applied to new types of aviation structures from 2020, as well as to the types of aircraft designs in production - from 2023. In the future, without significant modernization of the structure, the production of currently produced aircraft, which by 2028 will not meet this standard, should be discontinued.

"International Civil Aviation has again adopted a reference to solving the impact of CO2 aircraft emissions to the global climate," said the ICAO-Council President Dr. Aliava Benand Aliu, "The creation of air transport of the first industry sector in the world to adopt the design of the CO2 emission certification standard." "Along with our attraction agreement on the new offset and carbon reduction system for international aviation (creek), achieved in October last year at the 39th Assembly, these recent developments confirm the leadership and specific actions of our sector to ensure the sustainable and environmentally sound responsible future of civil Aviation worldwide, "added President Aliu." Given our commitment to more serious air transport, this historical achievement puts aviation to an even better position, "said ICAO Secretary General Dr. Fan Liu." We appreciate the initiation of the ICAO Secretariat staff, hundreds of experts in the Environmental Protection Committee (CAEP) on aviation ecology committee (CAEP) and state representatives on our air transport commission. " Until 2050, civil aviation emissions into the atmosphere of the Earth can be twice as compared with 2012. 107 scientists analyzed the effectiveness of various emission reduction methods for the main "working agents". According to scientists, the environmental situation can be significantly improved only by increasing the cost of upgrading equipment. Of all the options, the cheapest is just a package of passengers on aircraft more denser. Cuts in emissions in half to 2050 can be achieved by the appearance of the next generation of air fleet using light frames of carbon frames, aerodynamic wings and motors of open rotors. Simple updates to the current generation aircraft include Wingtips, Biofuels and electric transmissions for taxation. According to scientists, a separate technology will not solve the problem of reducing emissions. Only a set of measures will reduce carbon dioxide emissions by 2% per year.

A global market-based measure, adopted in October 2016 by the countries of the International Civil Aviation Organization, will limit net carbon emissions on international flights between member countries for 2021-2035. Initially, the limit was set at the average level of 2019-2020. The Carbon Offsetting and Reduction Scheme for International Aviation, or CORSIA, requires it to be assessed every three years against the goals of the Paris Climate Agreement, making it possible to tighten the cap in the future. Separately, ICAO is reviewing aviation emissions in light of the Paris Agreement.

If fully implemented, CORSIA could represent a significant step forward in global action to combat climate change. This could avert nearly 2.5 billion tonnes of CO2 emissions into the atmosphere during the first 15 years of the program - more if ambitions are increased by tightening the cap.

CORSIA affords airlines flexibility to choose how to cut CO_2. They can:

- Fly more efficient aircraft.
- Use new technologies to set more efficient flightpaths and reduce delays.
- Use sustainable lower-carbon alternative fuels.
- Invest in emissions offsets within or outside of the aviation sector.

CONCLUSION

While aviation is a relatively “clean” mode of transport by comparison, its climate and environmental impacts can become noticeable over time due to the ever-increasing air traffic, leading to increased pollution in the upper troposphere. Although estimates of such impacts are currently very uncertain, the International Civil Aviation Organization is taking steps to reduce the negative environmental impact of aviation.

To this end, new standards are being developed that tighten the requirements for aircraft in operation with respect to aircraft noise and emissions, and the list of aircraft emissions for which aircraft engines are certified is expanding.

The ICAO Environmental Committee proposes a Global Market Action Mechanism as the primary instrument for regulating aviation's adverse impact on the atmosphere. While not all ICAO members support this idea, there is a clear need for new technologies to be introduced in the aviation industry to reduce the environmental burden caused by air travel.

GENERAL CONCLUSION

The safety management system consists of four components, now we will briefly discuss each component in the form of a diagram, and then move on to more detailed details. The component of the approach characterizes the best goals and needs of the management. The policy provides the basic methods and controls for the SMS implementation, and the maintenance and control methods are critical security features within the automated systems plan and also pose security threats. The SRM and security components are central useful forms of SMS. These two components combine system safety and quality management in an interactive process. SRMs, as risks are distinguish and are analyze to survey and control risk. Security is where they are monitored to ensure they get to work to reduce the security threat. The Safety Assistance component provides fundamental forms for maintaining a strong safety culture, such as communication and training. An organization's security culture is part of the environment that surrounds all security management efforts. The tone structure and strategy for the SMS organization is under management control, but once configured, the most useful SMS forms are SRM and Security Notice, and security enhancements are not limited to a system like security culture, they saturate all components of SMS and the organization. Labor assets. The company shall ensure that each service organization has the necessary personnel to organize, perform, administer, review and support the performed maintenance work. The M&E organization has sufficient staff to organize, execute, control, review, plan and control quality to ensure that the organization consistently understands the Part 145 statements.

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