

THE IMPACT OF ADVERSE WEATHER CONDITIONS TO AIRPORT OPERATIONS SAFETY

Ján Lazorik – Peter Koščák

The thesis, The Impact of Adverse Weather Conditions to Airport Operations Safety, analyzes the overall security of the airport area. In addition, it assesses what the weather conditions cause and it describes, characterizes and evaluates them in detail. The main objective of this work is to determine the detailed specification of the impact of adverse weather conditions for the securing all air traffic at the airport. The work also details the meteorological phenomena that significantly influence and affect the safety and regularity of the air traffic at the airports. Moreover, the thesis includes the analysis of the airport operations safety, the particular methods and solutions to get rid of the calamities at the airports. It also outlines the methods of preventing calamities, whereas sometimes it is difficult to prevent disasters. The most important part is an adequate and thorough preparation for the removal of calamities at the airports.

K e y w o r d s: The safety of airport operations, Assessment of the status of operational areas, Dangerous effects

1 INTRODUCTION

The purpose of this work is to describe and explain the issue of airport operation during the adverse weather conditions and the impact of these conditions on the airport operations safety. The main aim of my thesis was to define and describe in detail which of the adverse weather conditions cause dangerous situations in airport operations and when the situation at the airport is critical. This work also details the various meteorological phenomena that significantly influence and affect the safe and regular air traffic at the airports.

2 SAFETY AIRPORT OPERATIONS

Security at the airport is a condition characterized as a characteristic of the object in which the possibility of risk of personal injury or property damage is small or is slightly lower than the acceptable level. This state is maintained through the continuous process of risk operating (risk management). Safety is widely seen as the result of proceedings with a view to maintaining the security risks in operating conditions, which are under the control of the organization. Human errors are unavoidable. During the building of a security system, we must take into account the organizational factors to create a defence system, which can reduce the errors and stop their spreading to another operation. The system should also help with intrusion detection and should properly

restrict certain critical requirements for the human factor.

Certain categories of aspects contributing this extraordinary risk potential are:

- density of air transport, its diversity, complexity to operate,
- national or international, scheduled or non-scheduled, charter, commercial or recreational traffic,
- collision of aircrafts on the ground,
- amount of high-energy sources,
- extreme weather (high winds, rainfall, high temperatures, poor visibility),
- aeronautical precipitation with animals and birds.

The only possible way to continue improving safety aviation is monitoring operational processes. It should be carried out regularly structured records about the watched process in the form of audits and through other forms to collect safety data. Nowadays, modern technology allows significant simplification rather problematic collecting data about the operational processes. The evaluation of these data takes place through predefined operations inside the database. The objective of the structured collection and data evaluation is to provide a current view on safety through the safety indicators.

2.1 Structure of the security system

Airport security management system processes the appropriate safety guidelines and operating procedures. These guidelines and operating procedures will be more easily implemented if the participants are involved in their development and include appropriate contractual documents (rental or operating contract). It will be necessary to achieve the high degree of cooperation between all the parties to achieve the necessary level of particular standardization and interconnection, which is necessary for safe operation on the ground.

2.2 Aerodrome traffic

Aerodrome traffic means all traffic on the manoeuvring area of an aerodrome and all aircrafts flying in the vicinity of the airport. This also applies to aircraft in the vicinity of the airport or the aircraft flying at an airport circuit, when it enters or leaves. Airport traffic is traffic at the airport, which helps provide a safe airport. This operation must be in accordance with the latest international and national aviation regulations, laws and requirements.

3 AIRPORT SAFETY MANAGEMENT SYSTEM

Safety management system provides a systematic process to identify hazards and control risks to maintain assurance that these risk controls are effective and operative. Safety Management System (SMS) is becoming a standard not only for the aviation industry worldwide, but also for safety management besides aviation. SMS can be defined as an approach to security, which is a systematic, explicit and comprehensive management process of the safety risks. Safety management system (as well as all management systems) provides us the setting of goals, the planning and the performance measurement.

3.1 Administration and management of the security at the airport

Airport management has to supervise the functioning and operation of all service providers, suppliers, tenants but also other parties involved in the security of the whole air transport process. It is necessary to ensure the safest and most efficient airport operations. Whole efficiency and the safety of complex airport safety management system must to be up to the knowledge of the aviation industry. Airport management must be involved in the promotion of a positive safety culture within the airport.

3.2 Airport reporting

One of the most important components of SMS is the functioning reporting system, because the security manager can not alone monitor the security situation even in a small airport and gain knowledge about the functioning of the whole operation. Reporting allows all participants at the airport to report accidents, emergencies, hazards and events.

3.3 Management securing and the risk of security at the airport

Safety movement at the airports belongs to internal airport security. Regulations and movement rules are defined in the airport operational orders that are prescribed for each category of people and resources. The principle is that any movement at the airport falls to the approval of the competent authorities of the control and the unauthorized access to the movement area is prohibited.

4 SECURITY OF THE AIRPORT OPERATIONS DURING THE ADVERSE WEATHER CONDITIONS

To maintain the equipment in the state in which endangers the safety or regularity of air traffic and air traffic performance, the plan of the maintaining program (including the preventive maintenance) must be processed. The surface of paved runway must be maintained

in such a condition that ensures good friction characteristics and low rolling resistance.

5 AN INFLUENCE OF THE ADVERSE WEATHER CONDITIONS

An important factor in adverse weather conditions is the prediction of the potential situation, assessment of the situation already arose, promptly responding at the situation and informing all components involved in securing a safe airport operations. The result of the presence of snow, ice and other phenomena icing on the runway, air traffic can be reduced or even stopped. When there are restrictions in air traffic, there are possibilities of violation of the timetable of aircrafts, and there is possibility of transcendence of the operational irregularities.

5.1 The control and appraisal of the aspect on RWY

The appraisal of the aspect of the airport motional areas and operational status of related facilities, have to be still monitored and reported. This is about notifications of operational significances that influence air operation from the point of view of safety aspect. It is necessary to profess and announce notifications in time. This information has to be provided to competent.

5.2 Influence of the winter season at airodrom operative mechanics

The operation of the airport in winter season is challenging not only in the organization of work, but also puts greater demands for drivers, squads of the technical equipments and also operational security technology. The basis of the successful realization of the works in the preparation of the airports, equipment and materials is timely and qualitative preparation of all staff to be involved in maintenance for the winter season.

6 DANGEROUS EFFECTS FOR SAFE AIRPORT OPERATION

Aquaplaning

Aquaplaning phenomenon is the loss of tire grip to the ground, which occurs at an increased speed of the vehicle at the wet roadway and the phenomenon can be defined as a loss of the tire grip to the ground by the influence of water, which is between the tire and the road. Therefore the tire does not touch the road but it touch the water wedge, which is due to poor drainage created. This phenomenon may occur especially during takeoff and landing, but may also occur in normal flight movements at the airport in locations runway intended for quick turnand places where aircraft move at high speed. During the formation of aquaplaning, it threatens a dangerous situation, because the aircraft becomes uncontrollable.

Ground-ice

Ground-ice causes problems at airports, mainly because the icing is manifested at the technical airport facilities (light technical means), the leading edge of aircraft wings and the other parts of the aircraft. In winter, it can be expected different types of icing meteorological phenomena that may negatively affect serviceability of the airport.

Glare ice

Icy runway surface is significantly impaired braking performance, especially when the runway surface temperature is around 0°C. This value is unacceptable option for take-off and landing aircraft. Therefore, it is necessary to prevent the creation of the icy layer on paved airfields and in cases where this occurs, make every effort to remove the layer of ice. Formation of ice has also a major impact on the safety of movement of the technical handling, carried passengers, where there is a risk of slipping and subsequent fall. The passengers or the personnel can be injured.

De-icing, Anti-icing

This process combines process during de-icing and anti-icing that can be performed in one or two steps. In winter, the use of de-icing

equipment is necessary. Even a thin layer of icing phenomena on the surface of the aircraft affects very negatively its aerodynamic properties during launch and flight. De-icing means are used for the avoidance of icing phenomena of the aircraft.

7 CONCLUSIONS

The aim of the thesis was to analyze the impact of adverse weather conditions to airport operation safety and regularity. By the review and analysis of the issue, I came to the conclusion that most of the meteorological elements and phenomena are linked together and they are shown individually or in combination. It is not easy to predict and anticipate adverse weather effects that threaten airport operation safety. Each meteorological effect must be monitored and evaluated, as it may evolve differently than it was expected in the early days. If the airport, at the moment of an adverse effect, does not have enough staff to ensure safe airport operations, it must assure the necessary staff as soon as possible to remove the adverse situation and re-establish safe and regular airport service.

BIBLIOGRAPHY

- [1] KOŠČÁK, P. and col.: Riadenie prevádzky letísk. Prvé vydanie. LF Košice, 2012. 245 s. ISBN 978-80-553-0759-6.
- [2] ICAO - Doc 9859 AN/460: Safety Management Manual. Third Edition. Montreal. 2012.
- [3] Safety management systems. [online document]. Available on the Internet: <http://en.wikipedia.org/wiki/Safety_management_systems>.
- [4] Letisková prevádzková príručka letiska Košice, 2010.
- [5] Nariadenie vlády Slovenskej republiky číslo 661 z 21. decembra 2005 o hlasovaní udalostí v civilnom letectve.
- [6] Systém manažmentu bezpečnosti, LU SR. [online document] Available on the Internet: <http://www.caa.sk/letiska_sms.htm>.
- [7] LAZORIK, Ján: Meteorologické kalamity a možnosti ich odstraňovania: Bakalárska práca. Košice: TUKE LF, 2011. 77 s.

- [8] KAZDA, Antonín: Letiská design a prevádzka. Žilina: Vysoká škola dopravy a spojov, 1995. 377 s. ISBN 80-7100-240-2.

AUTHORS' ADDRESSES

Ján Lazorik, Ing. Department of Air Traffic Management Faculty of Aeronautics Technical university of Košice, Rampová 7, 041 01 Košice, jan.lazorik@student.tuke.sk

Peter Koščák, Ing., PhD. Department of Aviation Engineering Faculty of Aeronautics Technical university of Košice, Rampová 7, 041 01 Košice, peter.koscak@tuke.sk