THE APPLICATION OF INNOVATIVE METHODS IN THE FIELD BIPA KOŠICE AIRPORT

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The aim of this article is to apply innovative methods used in the world for the Košice airport and suggest ways of their effective practical use. The work deals with fundamental and innovative methods of biological control of the airports. It analyzes methods used at the Košice airport and it also presents new methods used in the world. Which of the innovative methods would be most conveniently used in practice for the second largest airport in Slovakia in the metropolis of Eastern Slovakia, follows from the comparison of the work? The using of innovative methods depends on several factors. These include mainly the airport location, size of the airport and habitats in the interior and exterior ornithological protection zone.

K e y w o r d s: the method, the airport, the ornithological protection zone, habitat, bird - strike

1 INTRODUCTION

Collisions with birds are extremely dangerous in air traffic. This thesis analyzes these collisions from various points of view but mainly from the aspect of predicting and avoiding these threats. The objective is to implement innovative methods used throughout the world in Košice Airport and indicate most effective ways of them being employed.

This work involves all known and available information on methods and practices of biological protection of airports.

2 CHARACTERISTICS OF AVIATION SAFETY

Safety is characterized as the feature of an object, i.e. engine, technology, activity, not to endanger people or the settings. Analyses used to qualify the overall safety of an object include both the aspects of industrial safety and safety of technical equipment.

To be able to achieve this objective, it is necessary to pay attention to all elements of the "man – engine – environment" system. Ignoring any of these elements leads to the loss of balance of the system in consequence of an unwanted negative action followed by an abruption of the production process or activity which has a negative effect on all of its elements.

Man

If we take into account the ergatic system of "man – engine – environment" where the "engine" is represented by an aircraft, then many people see the pilot as the only "man" in this system. However, this system includes all people who are directly involved in the activity related to the operation of the aircraft. This includes other members of the staff, ground technical staff, flight control staff, meteorologists, etc. In broader context, it is necessary to include all people involved in air traffic, e.g. designers, constructors, maintenance workers, operation workers and management.

Engine

Although air traffic technologies have achieved considerable progress, there are cases when it is possible to find production and maintenance defects in the construction, which are classified as hazards. Many air crashes are caused as a consequence of defects in design conception and development state of the aircraft. Modern design conceptions minimize the effects of hazards. These objectives emerge from the *"damage tolerant"* conceptions which include the *"fail safe"* conception.

Environment

Environment is another element of the ergatic system. It has a direct effect on safety because the aircraft operates in certain environment where all necessary mechanisms are used and activities of people are implemented.

The performed activity

According to the "man – engine – environment" conception it is possible to consider a particular type of activity (assignment) or the purpose of the activity which is coessential. Ordinary risks related to various performed activities differ considerably. Flights in extreme weather conditions and flights in mild climates are considered different performed activities.

Each category of the performed activity has its own particular hazards which need to be accepted. This fact arises from the number of air crashes classified in particular category of the performed activity. This is why individual numbers of air crashes are categorized.

Aviation Occurrences

Their seriousness and frequency dropped dramatically after useful practices have been implemented in the safety management system.

Consistent with the global prognosis for the air traffic to grow there is a concern that traditional methods of the risk reduction to acceptable level might not be satisfactory.

This is the reason for the development of the new comprehension of innovative methods in safety control.

Similar to other systems the safety management system has its own evolution. Evolution of thinking when evaluating safety has undergone several stages.

Safety has a significant position in relation to air traffic. It represents a complex of questions of national security which includes protection of health and lives of people, protection of property of the respective state territory.

Active flight activity performed in compliance with the requirements of the aviation personnel education according to EASA is interdisciplinary connected to the situational control of the aviation training ergatic complex.

3 KOŠICE AIRPORT

The Košice International Airport is the second largest airport in Slovakia. Košice Airport lies in the Hornád basin approximately 5 km south-west of the Košice city among settlements of Pereš, Poľov, Haniska and Šebastovce. The airport is surrounded by agricultural land with intense production of cereals, forage crops and root crops. Forest complex, Hanisk forest, lies to the south of the airport. It is formed by oak and hornbeam vegetation.

The runway is 3100 m long and 45 m wide. It has asphalt surface and its orientation is northeast – southwest. A parallel taxiway on the east side is connected with the runway by five links.

3.1 Biological protection of the airport

The airspace is fully under control of ornithologists. They do not only use man guards and technology but also birds of prey.

The surrounding of the Košice Airport runway is guarded by the so called "biological guard". Birds of prey named Belo, Kočka, Erik, František and Haris scare off birds over the airport as well as rodents on runways.

The Košice Airport is divided into two ornithological protection zones. **The inner ornithological zone** is formed by a rectangular the longitudinal axis of which is identical with the axis of the runway, the width of which is 1000 m (500 m on either side), and the length of which exceeds the runway by 1000 m on either end. **The outer ornithological zone** of the airport is based on the inner one and has a shape of a rectangular the longitudinal axis of which is identical with the axis of the runway. Its width is 2000 m (1000 m on either side of the runway) and its length exceeds both ends of the runway by 3000 m.

The first evaluation of the area of the Košice Airport and its avifauna from the point of view of air traffic safety took place in years 1979 and 1980.

Several types of biotopes are present in the airport area. These include grass areas, stretches used for agriculture, shrub-woods, wood vegetation, tree lines, tree groups and forests, but also buildings, operation facilities and technical features.

The Košice Airport as the largest airport in Eastern Slovakia and second largest in Slovak Republic uses several methods to reduce the occurrence of aircraft collisions with birds. Each method has its pros and cons.

The significance of these activities lies in their combination. Pyrotechnical method, trapping, direct movement scaring are used but as mentioned above, the most common way is falconry.

4 INNOVATIVE METHODS OF BIOLOGICAL PROTECTION USED IN THE WORLD

English airport of Gloucestershire encounters problems with the amount of birds and has tried to find a way to eliminate them. They have tried many ways of which only one proved to be working. It is unbelievable but the truth is that birds on this airport are scared off by the voice of Tina Turner. The airport in the English town of Gloucestershire has found an effective tool to scare off birds from the runway. The strong and distinct voice of the singer which is played from the loudspeakers on high volume is a reliable way to scare off crows and seagulls.

The employees have tried many methods to scare off birds, including maroons and fireworks, swinging waste bags above their heads or playing sounds of predators from loudspeakers.

Birds are airports´ unwelcome guests because if they are pulled into the aircraft engine it can be damaged. *"We used to play sounds of predators from loudspeakers to scare off birds. However, when they stopped working it turned out Tina Turner was much more effective."* said Darren Lewington, an employee of the airport.

The airport thus plays Tina Turner's greatest hits such as Simply the Best and What's Love Got To Do With It. The loudspeaker is mounted on the top of the car which drives along runways.

Exclusion

Access to attractive areas can be denied or discouraged by using physical barriers. Such barriers are mainly used for buildings and for open water, but also for landfills if present in the airport or its neighborhood. Buildings and other facilities are used by birds as roosting sites, for example starling and pigeons often seat on ledges or in hangers, gulls on open water.

To prevent these unwanted guests from coming airports throughout the world use spikes on ledges, flat surfaces are covered with wires or metal nets. Sticky substances are used as well but these only have temporary effect. On flat ledges, metal strips can be applied with an angle greater than 45°. Another method is using curtains of heavy plastic under roofs to prevent the birds to roost.
Water bodies such as ponds or lakes can be made inaccessible with wire systems. For gulls, a grid of 6 x 6 meters proved to be useful, for waterfowl a smaller grid (3 x 3 meters) is sufficient. Exclusion of landfills as a food source (mainly important for gulls) is best done by daily covering of the waste. Wire systems have also been successfully used on landfills. Waste sites at meat- or fish-processing industries should also be carefully covered. Such landfills are a golden mine for hungry birds, mainly gulls. Gulls appear to use several feeding

sites spread out over a large area. It is therefore important to take measures at all potential feeding grounds in wider surroundings than just the close vicinity.

Experiments have been conducted with heated surfaces, based on the assumption that
gulls (whose impact on the safety of air traffic at airports is greatest of all birds) prefer warm surfaces for roosting or loafing. Unfortunately, no positive results were obtained.

Reta

Israel is considered a country as well as a bridge joining Europe, Asia and Africa. This is the reason why approximately 500 million migrating birds fly through this country. Migration occurs in autumn when birds fly to the south, and then in spring when flocks of birds move back to north. Migration takes place both during the night and the day and most birds fly very low above the ground. Big birds, birds of prey, pelicans or storks make use of rising warm currents to achieve height which makes them a threat for aircraft. They usually fly about 1000 m above the ground which is the altitude Israel's armed forces train in.

As mentioned above, this country suffers from almost largest bird migration. This means safety of Israel's airports is dramatically affected by birds. Israel's largest airport – the Ben Gurion Airport in Tel Aviv – uses one of the most extraordinary methods. 4,5 km from the airport a huge landfill called Hiriya was set up in 1952. This site is now 172 areas big. This is one of the reasons why the airport and its neighborhood is infested with so many birds.
Airport's surface is sprayed with Reta (aluminum ammonium sulfate). This spray caused a decrease in the number of gulls in the airport's area. Although Ben Gurion considers this method combined with other ones quite effective, in several other countries (Denmark, Switzerland, France), tests with Reta failed to produce good results.

Polybutene

As mentioned above, chemical repellents are only legal in the USA and Australia. In other countries repellents containing polybutene or polyisobutylene are available. These are applied to surfaces in liquid or paste form and make birds feel uncomfortable when they land. To ensure 100% success in removing unwanted guests from the protected ornithological zone, application should be repeated every half a year to year, sometimes even more frequently.
Examples of polybutene and polyisobutylene types: Bird Stop, Roost-no-more, Bird-X, 4-The Birds, all of them non-toxic.

5. CONCLUSION

In the end, it is necessary to point out the importance of the biological protection of airports. If ornithologists did not deal with this protection, the number of crashes on airports caused by the collision with a flock of birds or other unwanted guests on the airport would be unimaginable.

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