ANALYSIS OF BIRD COLLISION WITH PLANES AND POSSIBILITY OF UTILIZATION OF THE BIRD STRIKE PREVENTION MEASURES.

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ABSTRACT

Usually after serious bird strikes is undertake the measures of prevention similar case in future. Careful analysis of the bird strike, including bird behaviour and various factors of environment show reveal the reasons of appearance of birds on the plane way and consider the possibilities of various measures against repetition such cases. (A examples of collision of landing plane with starling flock, flying up from land, and collision of plane at high altitude [illegible] with swift show impossibility bird strike prevention without timely revelation of birds. It is discussed some approaches for solution of this problems.

[illegible] to defining of problem of bird strike danger in the world – when the mighty impulse for the works on bird strike prevention on airdromes has [illegible] the crash of [illegible] plane at Boston(USA) in [illegible] as a result of collision with flock of starlings. The crash of [illegible] in the area of the American bird ringing centre in [illegible] as a result of collision with the [illegible] by night, and an impulse [illegible] not only [illegible] for birds(geese, [illegible] military [illegible], too. [illegible] fighter [illegible] led to develop- [illegible] migrations with the aim to [illegible] their [illegible] flight on the planes way(Blokpoel, 1973). Such an approach, when after dangerous bird strike measures are taken to prevent repetition of such cases in future, increases effectiveness of taken measures because in each case there is known the bird species and the situation which led to collision and it is possible to prognose such situation and to undertake concrete measures. The considerable increase of the effectiveness of measures to be undertaken is connected with discovered by us the general regularities of bird behaviour in interaction with various technical devices, including a plane. Victims of bird strikes becomes first of all bird who saw for the first time a plane on short distance and who could not deviate from its way in due time. There are first of all migrating birds and birds coming for winter stay as well as young birds local nesting on airdromes. This determines general strategy to carry out measures to prevent bird strikes(time to carry out measures during season of migration and of young birds appearance and general principles of bird behaviour control on airdromes: active frightening off or creation of ecologically unattractive places for birds on airdrome, or prognosing of appearance of mass bird accumulation on planes way. at airdromes and out of them, as well as concrete tactics to carry out such measures on individual airdromes. It is connected here with concrete

species and groups of birds inhabiting individual airdromes with periods of their migrational activity, with time of young birds activity, with concrete features of attractiveness of ornithological situation on airdrom. The task of aviational experts and ornithologists is to select the most effective tactics of "fight" against birds on each airdrome. And only concretization of bird species against which one are fighting and of terms of conducting measures increases considerably their effectiveness. If one points concrete terms of flight of migrating birds, dangerous for a plane or time of appearance of young local nesting bird species- the effectiveness of preventive measures increases sharply. Just during these periods and in other time(for example in a winter) there will not be any nessesity to carry out such measures on northern airdroms. However, being prompted by results of analysis of bird strikes at given airdrome- it will be possible to propose concrete tactics of preventive measures application in concrete terms. These means are proposed from a fact that formerly they were applied successfully under similar circumstances. And in the same time-when considering circumstances of a bird strike and possibilities to prevent them- there appear situations when tested bird frightening means because of series of reasons can't be used to prevent bird strike. Furtherly, proceeding from an example of one bird strike analysis, I would like to consider- whether it could be possible to prevent this bird strikes and what can be recommended to prevent similar bird strikes in the future. 17.04.1985 at 14.57 at airdrome Vilnius(Lithuania) transport four engine turboprop plane AN-12 collided during a landing with flock of starlings at altitude 20 m. and a 300 m distance from the end of runway. According to pilot's evidence the starlings flock composed by 100 individuals at the sight of quickly approaching plane took of from a land against a wind and than turned to wind and started to turn aside when it was overtaken by the plane. The remains of 25 starlings were found on a land under place of collision at 20 m radius. At the plane there were noticed bird hits at pilot cabin glass, at oil radiator, chassis, wing.

[illegible] bit in airintake of the first engine of [illegible] bit in airintake of the second engine. His last one was removed from the plane and replaced. The plane has been landing with switched landing lights. At 14.30 that is 27 min. before [illegible] landing, another passenger two-engine turboprop plane [illegible] has been landing by the same course consequently the [illegible] flock sit on land within period 14.30-14.57. Circumstances determined the flock's flying off were following:

1. Bird attention was distracted by food searching on humid ground between a turf of last year grass. 2. The birds were turned by "Dove" toward wind and by back to landing plane [illegible] did not see its one its landing lights. 3. The birds took off formerly toward a wind and not aside of the plane. 4. The contrary wind has decreasse the speed of sound from planes engines to birds. 5. The flock was migrating one and bird did not know the plane's donger here in this place. Can airdrome dispatcher do anything to prevent such collision?

The first what comes into mind is to use more frequent and more successfully applied active repellents: shoot from a rocket pistol, bioacoustic installation (stational or moving-at an air). To use these means it is necessary first of all to discover birds. But in examined case the landing of starling flock and its taking off when the plane approached were not discovered neither by starting point dispatcher nor by radar dispatcher. It was not discovered neither visually from 5,5 km distance, nor at radar of landing from 1 km distance. Therefore it is not possible here to use active bird frighting means, mentioned above. The more this relates to rocket shoot or to bioacoustic repellent signal translation from an [illegible] part of birds discovery it is necessary to come to them by a car. And such an approach by an automobile may become more [illegible] result if birds are sitting not on runway concrete but for example on relatively large distance from the end. In this respect is more useful to apply the stational plants: bioacoustic or pyrotechnical which switches on by telemetric way. In order to discover birds and to have to approach then it in necessary to use such frightening means as hawks, falcons, radiocontrolled models.

It is not necessary to discover birds and to have time to approach them- when creating ecologically unattractive conditions-first of all for bird's feeding, nesting, and rest at places of their possible landing in the area of an airdrome or erection of some obstacles for such landing. However inspite of great variety of these means- they are not universal. The obstacles for feeding of granivorous birds don't prevent feeding of insectivorous birds at conditions unfavourable for nesting of one birds are favourable for other bird species. And there is no such chemical means utilization of which could fright off all bird species.

Because the change of attractiveness of some or other places for birds can prevent bird's landing on these places but not a flight over them(Jacoby,1964). Processing by chemical means-repellents don't prevent(in my opinion) the flight over these places and according to some experiments they did not confirmed as bird repellents because majority of birds have weak sense of smell.

Chemicals against insects will not act as defoliants and so on. Birds will fly over a land or water surface covered by a net. In such a way even passive means to prevent bird landing on the ways of plane's flight toward an airdrome don't give any full effect.In the same time there are not any good proposals to prevent bird landing on warm concrete of a runway under cold weather,or to prevent catching of insects by swifts or swallows over a runway. The only thing what can be done to repel birds feeding on a runway is to remove from runway's concrete rain worms,birds,insects and mammals killed by a plane or plant seeds brought by a wind. Therefore we don't see means to prevent swallow flight over a runway for catching of insects in warm air over a concrete. And we know several cases when swallows hit jet-plane engines during take-off or landing run along the runway.And it was neccesary as a result to change or remove damaged engines. Bioacoustic,pyrotechic and other active repelling means practically do not act against swallows. In such a way in some cases-the exploitational shortcomings of repelling means

The necessity to discover birds and to prognose [illegible] and in other cases [illegible] of rolling [illegible] that birds are determining impossibility to prevent bird strike(Jacoby,1986).

Out of an airdrome one can undertake measures to prevent plane's collision with the accumulations,mainly migrating birds as a result of their discoverage(visual or radar)or prognosis of mass bird's appearance on plane's way.However it is practically impossible to discover in due time visually or by radar(surveillance,precision approach,Jacoby,1984 and aircraft)the birds flying one by one or by scattered groups and to prognose their appearance on plane's way.

For example [illegible].1970 at [illegible].30 four engines turbo prop plane IL-18 which took off from Sochi airdrome(Black sea coast) having speed 400 km/hour collided at 3000 m altitude with swift(Apus apus).The bird make a hole in plastic cover of radome and damaged aircraft radar aerial.In result arised difficulties during plane landing in Erevan.In this case neither a pilot nor dispatcher of airdrome surveyllance radar have seen a bird(may be flock of birds)before a collision. This is concerned with relatively numerous cases of collisions with soaring birds-eagles,buzzards,black kite,single flying pigeons,gull and series of sparrowlike species.

As typical example of this kind it may serve the collision of four engine turbojet plane with vulture(Aegypius monachus)at 12 km altitude over a mountain in Africa.It is unrealy to see slowly soaring even large bird on screen of surveyllance airdrome or plane's radar.I don't know cases when a pilot after noticing soaring bird could turn away from it in order to prevent bird strike.In the same time according to information airdrome surveyllance radar dispatcher at Odessa he noticed echo-signal of relatively great size on the way of IL-18 plane approaching Odessa at altitude 3000 m.The Pilot being warned by disputscher,saw in front of plane tremendous geese flock and had time to turn away from them.

As an optimal solution of problem of bird strike danger on airdrome and out of it(including cases considered above)

it would be bird frightening away of a plane by means installed on a plane.Unfortunately the attempts to use for this sake the light impulses,switching of landing lamps,radar and lazer radiation,colouring of nose part of a plane by "eyes" do not give,in my opinion,any biologically applicable repellent effect(Jacoby,1976).

In such a way one can speak about exploitational,biological and technical shortcomings of utilization of means to direct and to prognose bird behaviour with aim to prevent bird strikes.Therefore when working out recommendations to use some and other means to prevent bird strikes on concrete airdromes it is necessary to prognose its effectiveness with taking into consideration the shortcomings of its application. And it is necessary here to foresee measures to eliminate for example the shortcomings of bird discoverage in due time or bird landing on ground or on airdromes runway.This can be done by means of instruction to pilots of starting plane to inform about birds discovered on a runway or to modernize airdrome radar in order to discover the birds sitting on the ground taking up of which can bring a bird strike. It would be ideal to work out automatic disclosure of birds in flight by plane's radar and presenting of command to plane's steering gear in order to escape appearing in front bird accumulation.I don't know-whether such device exist practically. Apparently it can be used only under horizontal flight when a plane flies out on an airdrome.

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