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Оценка состояния существующих аэропортов Арктики

Estimation of the state of existing airports in the Arctic

Аннотация

Целью данной статьи является обзор состояния аэропортов Арктической зоны. В настоящее время Арктика является важным ресурсом для всех стран, и возрастает потребность в развитии транспортной сети в этом районе. Статья содержит обзор состояния аэропортов Арктической зоны Российской Федерации. Также статья содержит описание состояния инфраструктуры аэропортов Арктической зоны Российской Федерации и других стран. В данной статье рассматриваются возможные пути решения проблемы состояния арктических аэропортов.

Ключевые слова: Арктика, аэропорты, инфраструктура Арктики, сеть, транспорт, Российская Арктика, аэродромы, удаленность, вечная мерзлота, авиация.

Abstract

The purpose of this article is to review the state of the airports in the Arctic zone. Currently, the Arctic is an important resource for all countries, and there is a growing need to develop a transport network in this area. The paper contains an overview of the state of the airports in the Arctic zone of the Russian Federation. The article also contains a description of the state of the infrastructure of the airports in the Arctic zone of the Russian Federation and other countries. This article discusses possible solutions to the problems of the state of the Arctic airports.

Key words: Arctic, airports, infrastructure of Arctic, network, transport, Russian Arctic, airfields, remoteness, permafrost, aircraft.

Introduction

Today, Arctic is a new developing part of world infrastructure. It is very important area for global economic, energetic sector, defending of borders and for foodstuffs. However, there are some problems associated with peculiarities of the territory of Arctic zone. One of the most important of them is the problem of Arctic

are climate and location. The climate of Arctic is very hard. This makes costs of operation very high. Inaccessibility of territories makes it more difficult to move resources, machines, people to the place, that can give a big rise in the cost of the transportation process. Because of these facts it is important to provide a transport network of Arctic zone. Currently, 39 aerodromes located in the Arctic zone of Russian Federation are registered in the State Register of Airfields and Heliports of Civil Aviation, of which 35 aerodromes are equipped with light signaling systems, only 24 have artificial surface. Moreover, most of them are in disable or emergency state due to operational wear. There are more airfields in Arctic, some of them are not included in State Register. Due to the program "Comprehensive plan for the modernization and expansion of the main infrastructure" 24 airports in the Arctic zone will be restored till 2024.

Overview of the state of the airports in Russian Arctic

Until recently, the number of airports in the Arctic zone of Russia exceeded 70. However, in May 2021, government decided to close about 37 airports in this zone due to the lack of the ability to service ships at these airfields [1]. Actual list of the Arctic airports is in Table 1.1.

Table 1.1 – List of Arctic airfields

№	Name of airfield	Location	Class	Opening date	Average passenger traffic, thousands	Runway strip cover
1	Talagi	Arkhangelsk	C	1963	661,79	concrete
2	Narian-Mar	Narian-Mar	C	1941	201,90	concrete
3	Salekhard	Salekhard	B	1933	309,88	concrete
4	Nadim	Nadim	C	1969	178,90	concrete
5	Noyabrsk	Noyabrsk	C	1983	213,54	concrete
6	Deputatskiy	Deputatskiy	D	1951	13,85	soil
7	Cherskiy	Cherskiy		1929	7,64	- [1]
8	Ust-Kuiga	Ust-Kuiga	D	1947	4,08	soil
9	Chokurdah	Chokurdah	D	1943	6,77	concrete
10	Sackiir	Batadai-Aliga		1950	6,02	
11	Beringovskiy	Beringovskiy	E	1974	2,26	soil
12	Kresta Bay	Egvecinot	E	- [2]	9,35	soil
13	Keperveem	Keperveem		1975	23,36	soil
14	Lavrentiy's Bay	Lavrentia	E	1950-1955	6,62	
15	Markovo	Markovo	D	1941-1945	2,90	soil

[1] This symbol in this column means lack of information.
[2] This symbol in this column means lack of information.

16	Shmidt's Cape	Shmidt's Cape	D	1954	recovering	concrete
17	Omolon	Omolon	E	1944	1,46	soil
18	Pevek	Apapelgino	C	1939	22,52	reinforced concrete
19	Provideniya Bay	Ureliki	D	1947	5,45	soil
20	Amderma	Amderma	C	1935	1,98	concrete
21	Turukhansk	Turukhansk	F	1926	21,28	concrete
22	Norilsk	35 km from Norilsk	A	1968	482,69	reinforced concrete
23	Anadyr	Anadyr	A	1950	98,52	concrete
24	Bovanenkovo	Bovanenkovo	B	2007	97,12	reinforced concrete
25	Vorkuta	Vorkuta	C	1946	33,87	concrete
26	Igarka	Igarka	C	1949	223,13	concrete
27	Noviy Urengoi	Noviy Urengoi	C	1975	875,49	reinforced concrete
28	Khatanga	Khatanga	C	1958	18,38	reinforced concrete
29	Yamburg	Yamburg	C	1984	62,90	reinforced concrete
30	Vaskovo	Arkhangelsk	D	1981	24,08	concrete
31	Varandey	Varandey	D	-	15,35	concrete
32	Solovki	Solovetskiy	D	1991	11,75	metal
33	Tixi	Tixi	D	1958	17,87	reinforced concrete
34	Dixon	Dixon	F	1930	2,51	concrete
35	Svetlogorsk	Svetlogorsk	F	-	-	concrete
36	Krasnoselkup	Krasnoselkup	D	1950	14,65	reinforced concrete
37	Stone Cape	Stone Cape	D	1948	15,00	soil
38	Dome	Chukotskiy Autonomic District	D	2009	-	soil
39	Omsukchan	Omsukchan	D	-	6,79	soil
40	Saskilakh	Saskilakh	D	1958	13,65	soil

41	Nothern Evensk	-	D	-	8,22	soil
42	Tarko-Sale	Tarko-Sale	D	1962	28,45	soil
43	Tolka	Tolka	D	-	7,81	soil
44	Urengoi	Urengoi	D	-	16,74	soil
45	Cherkeskiy	Cherkeskiy	D	1991	7,64	soil
46	Amderma-2 (Rogachevo)	Belushia Guba (New Land)		1972	-	concrete

Most of them are located in Yamalo - Neneck Autonomic District and in Arkhangelsk Region. Airports and airfields can be divided by classes from A to F.

Airfields are classified according to the length of the main artificial turf runway under standard airfield conditions. The required lengths of the artificial turf of the runway and runways are determined from the condition of ensuring the safety of an interrupted and continued takeoff, as well as the landing of a design type of aircraft with a maximum takeoff (landing) weight, taking into account the possible failure of one of the engines. An aerodrome belongs to the corresponding class if the length of the main artificial surface of the runway, reduced to standard aerodrome conditions, is not lower than the classification indicators of the table 1.2 [2].

Table 1.2 – Classification of airfields by classes

Class of the airfield	Length of the runway strip in standard conditions, m
A	3200
B	2600
C	1800
D	1300
E	1000
F	500

Most of Russian Arctic airfields have class F. It means that the length of its runway strip is from 500 m to 1000. Diagram of proportion of Arctic airfields divided by classes is presented on the Figure 1.1.

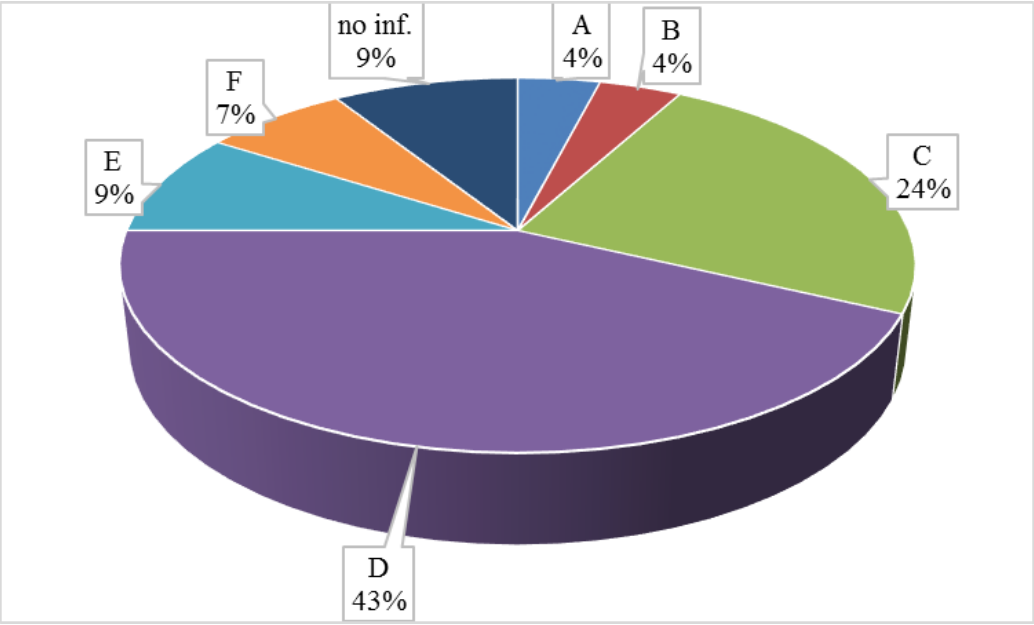

Figure 1.1 – Proportion of Arctic airfields divided by classes

Based on the above diagram, it is obvious that the largest number of airports in the Arctic zone of Russia belongs to class D (43%). This means that most of the airports in this area have a runway length of 1300 to 1800 m.

Also, airfields can be divided on 2 groups by coverage of the runway strip: with artificial turf and soils turf. For artificial foundations and thermal insulation layers, heavy and fine-grained concrete, light concrete, rigid concrete mixtures, dense, porous and highly porous asphalt concrete should be used. The materials of all layers of artificial foundations must meet the requirements for frost resistance, corresponding to the climatic conditions of the construction area [(7.2.1-7.2.2), 3]. Most of Artic airfields have soils cover of runway strip. Diagram of proportion of runway strip turf of Arctic airfields is presented on the Figure 1.2.

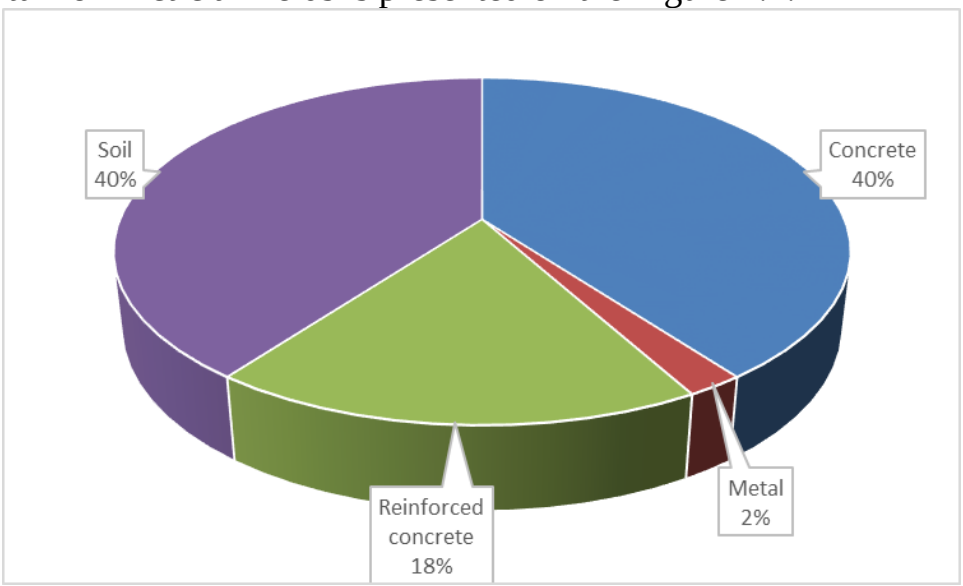

Figure 1.2 – Proportion of runway strip turf of Arctic airfields

Based on the above diagram, it is obvious that the runways of the largest number of airports have soils and concrete pavement (40% for each). The smallest number of runways have metallic cover (2%).

For now, most of the airfields are not repaired on time due to the lack of recoupment. The oldest airport was opened on 1926. Some of the airports in the Arctic zone have never been renovated. Despite the fact that there is a program "Strategy for the development of the Arctic zone of Russia and ensuring national security until 2035 [4]", it does not take into account all airports in this zone (only 35 airports are going to be recovered). Also, soil cover, which is the most often for airports of the Arctic zone, is not suitable for Arctic conditions. More than 50% of airfields require urgent overhaul. However, in the case of repairing such airports, the cost of repairs exceeds the payback period, which is not a viable investment. This problem can lead to emergencies, difficulties in communication between remote settlements and cities, where air communication is the only mode of transport. Also, problems with air traffic can lead to difficulties in the transportation of essential goods for life and other logistical difficulties.

Ways of improving Arctic airports state

The problems of the Arctic zone are difficult climatic conditions, inaccessible location of the territory, poor transport network, remoteness. All these conditions make any activity in the Arctic zone difficult. To improve conditions in the Arctic, first of all, it is necessary to improve the transport network. A possible solution to the problems of the state of the airports in the Arctic zone can be the following steps:

– optimization of airports in the Arctic zone (closure of dilapidated airports that are not used);
– arranging financing for airports of medium size and cargo traffic;
– search for options for the optimal reconstruction of existing airports;
– re-equipment of airports with a runway length of up to 1500 m for other needs (small aircraft);
– construction of a new type of airport that could recoup the construction costs, considering the situation in the Arctic (for example, a floating airport).

Conclusions

Repairing of onshore Arctic airports is a difficult task. Mostly, because of the cost of repairing. Also, there is a problem of transportation of work force. Arctic is a remote area. As it is impossible to provide landing of most modern planes in world Arctic airports, it is necessary to transport cargos and people other ways. Sometimes it is impossible or unreasonably expensive. However, possible solution to the problems of the state of the airports in the Arctic zone can be the following steps: optimization of airports in the Arctic zone, arranging financing for airports of medium size and cargo traffic, search for options for the optimal reconstruction of existing airports, re-equipment of airports with a runway length of up to 1500 m for other needs, construction of a new type of airport that could recoup the construction costs, taking into account the situation in the Arctic.

Consequently, in the conditions of the Arctic zone, it is necessary to create an optimal airport that will be safe in operation, durable, and suitable for landing modern aircraft. Based on all the above recommendations, the best option would be an airport with a runway length of 1500-2000 m and a coating in the form of concrete or reinforced concrete, depending on the loads.

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