

POTENTIALS OF REDUCING OPERATIONAL COSTS IN THE SUBSYSTEM OF WINTER AIRPORT OPERATION

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The aim of this article is to briefly describe the issue of the options in reducing operational costs in winter maintenance of airport. The intention was to show the methodology and procedures designed for ensuring safe air traffic in winter months and by using Gantt charts to illustrate the overall time of performance of different activities. This article also contains suggestions to improve facilities by technical means, the organization of work and structure of operational costs of the airport of Košice during the winter maintenance of movement areas of the airport.

K e y w o r d s: winter maintenance, airport movement area, Gantt chart, plan a winter maintenance of airports, public airport.

1 INTRODUCTION

Every public airport must be prepared to ensure the required quality of movement areas of airport for movement and operation of airplanes and vehicles. It is therefore necessary to regularly clear and maintain the airfield to be capable of safe service in all conditions, especially in winter months.

2 WINTER MAINTENANCE OF AIRPORT

Winter maintenance of airport is a complex of management and executive activities which ensure the carriageability and operational ability of runways in the winter as well as an organized system of information about the airfield conditions.

Snow, ice and frost on the movement areas on airfield means a certain degree of security threat within the movements of airplanes. These frost-phenomenon may cause a dangerous situation. Therefore the airfield must be carefully prepared for the typical upcoming winter season, for the first snowfalls and for the freezing temperatures in order to offer the feeling of a safe harbour for the passengers in the winter.

The winter period of the year is not underestimated by the airport's staff and each year they thoroughly prepare for it. They have at the disposal sufficient supplies of de-icing fluids for airplanes as well as they have special airport mobile equipment, which is specially used during heavy snowfalls for taking care of runways, taxiways, aircraft stands, aprons and roads in the public areas of the airport.

Chosen members of the airport's staff regularly receive training aimed at increasing their proficiency in the field of winter maintenance of movement areas of the airport and de-icing of airplanes.

The result of the defective condition of movement areas can be a shutdown of the airport. The winter service of the airport means for the airline companies a loss in profits and for the airport operator it also means an increase in operational costs.

The aim of the winter maintenance is to ensure the safety and regularity of air traffic in the winter regardless of weather conditions. Furthermore, to maintain operability of movement areas of the airport in such a condition that ensures good friction characteristics of the runway which is in contact with aircraft tire, high coefficient of braking effects and low rolling resistance of snow and water.

3 ANALYSIS OF PROCESS OF WINTER MAINTENANCE AT THE KOŠICE AIRPORT

Winter maintenance must be carried out in order to maintain the operational capability of airport movement areas in all weather conditions, with effective use of manpower and technology designed for winter maintenance. Preparing the airport for the winter season includes timely and quality preparation of the personnel, equipment, tools and materials.

3.1 Procedures used in the winter maintenance

Works at the airport movement areas of the Košice airport are to be provided immediately, as soon as there is snowfall, which leads to a decrease in braking effects or the height of snow cover restricts the operation of the aviation equipment at the airport movement areas.

To ensure the required quality of surface of the airport movement areas it is important to avoid the snow to be massed up on the airport movement areas, no matter what is the quality of snow. It must be avoided the snow during the service to be compressed or a coherent abutment of snow on the surface of the airport movement areas to be created.

In order to remove the snow, the following tools are used according to the current weather conditions and needs:

- Dry snow from 1 cm up to 3 cm high – sweeping and blowing by airport sweeper,
- Dry snow above 3 cm high – plowing, sweeping and blowing by airport sweepers or the use of individual plows, if necessary,
- Wet and mashed snow – plowing, sweeping and blowing by airport weepers.

In case, when the water and the remains of wet snow start to stuck by the ground due to low temperatures or the braking effects of the runway decrease after continuous sweeping due to the so-called „polished“ concrete effect, and after the removing of snow and depending on the air temperature, the runway should be sprinkled with pre-steeping.

Tab.1 Means winter maintenance of airport movement areas

Snowplough	dry and wet snow, depending on the amount of snow cover
The airport sweeper	dry snow and wet snow, important is the amount of snow cover
Snowblower	removing snow mounds
Muck	the application of chemical de-icing materials
Wall-mounted sprayer	application of liquid chemical de-icing equipment

3.2 Processes of clearing the airport movement areas during the winter service

Removal of solid precipitation is done by blowing, sweeping, plowing, cutting and spraying with chemical de-icing agents.

According to the amount and consistency of precipitation it is decided which method of clearing and technical equipment to be used.

This is determined by the height of the snow cover:

- Dry snow up to 1 cm high – blowing by airport sweeper or jet blower,

3.3 Technical equipment of airport for winter maintenance

Vehicles and mechanisms play a crucial role in winter maintenance. The speed and the quality of snow removal largely depends on the number and the performance of technical facilities. Several kinds of technical equipment are simultaneously used for removing snow and de-icing at the airport of Košice.

Vehicle depot of the Košice airport is largely composed of these vehicles:

- 3 pcs of RS 200 sweepers and RS 2000 with steel brush + trailer + snow plows
- 1 piece of SX 600 heavy snowblower
- 1 piece of ROLBA 300 snowblower
- 1 piece of SFT 7045 tractor snowblower
- 1 piece of WESTA 750/2500 tractor snowblower
- 1 piece of T 815 with heavy plow with rubber lip
- 1 piece of Z 10641 tractor with plow with rubber lip
- 2 pcs of Z 8111 tractors with snowblade with light metal lip
- 1 piece of Z 7011 tractor with sprayer of with suspension spreader
- 1 piece of UK 3000 sprayer.

3.4 Organization of work during the winter maintenance

Winter season is really demanding to employees of airports in general. Maintaining a clear surface of airport movement areas is the responsibility of the airport operator and the taking in consideration of operational capability is carried out by the staff of airport control center.

Services are performed in 12-hour shifts. The supervisor of the shift coordinates the actions according to the instructions and also carries out administrative duties.

3.5 Personnel organization

Considering the operational capability of airport movement areas is carried out by the dispatching personnel of the Košice airport.

Carrying out the winter maintenance is ensured by the foreman of the technical division of winter maintenance in service. Every employee considering the operational capability of runway and taxiway and every employee assigned to the post of foreman of winter maintenance has to be familiar with the organization and execution rights during the winter service of airport movement areas according to the operational manual; parts 1 to 4.

The winter maintenance is carried out by the foreman of the technical division in service and by the drivers of special vehicles in service.

In case of calamity (snowfall in 24 hours greater than 10 cm, intensity of snowing greater than 3 cm per hour for more than 2 hours, coherent frost or icy surface) the employee of the department of airport dispatching informs the head of the calamity staff about the situation.

3.6 Structure of operational costs

The mild winter in 2011/2012 was reflected in a decrease of performance of activities and in the cut of costs compared to the year 2010. In 2011 was a mild winter compared to the previous year, what was reflected in the consumption of gritting material, which was lower by 40%.

Winter maintenance of Košice airport was provided on the required level and towards the

quality of the work were introduced no major complaints or comments. Ensuring the capability of technical equipment is annually demanding and relatively expensive. Technical condition of vehicles and equipment is appropriate to their age, but it has a significant impact on the consumption of spare parts. By better organized work, maintenance and by better use of technical equipment the costs of spare parts were cut.

Tab. 2 Operating costs in 2011

Accounting class	Indicator	Sum in €
50	Consumed purchases	1 739 928
	-Consumption of material stock	1 039 540
	-Consumption of fuel and energy	515 064
	-Consumption of nonstock store	185 324
51	Services total	2 640 660
	-Repair and maintenance	1 652 152
	-Journey money	1 456
	-Representation expenses	1 789
	-Other services	985 03
52	Personal expenditures	4 602 671
	- Labor costs	3 220 593
	- Legitimate social insurance	1 137 385
	- Other social insurance	40 059
	- Legitimate social costs	204 018
	- Other social costs	616
53	Taxes and fees	239 941
54	Other costs from operational activities	307 978
55	Writing-offs, reserves and adjusted entries	5 306 826
Sum of the operational costs		14 837 914

4 POSSIBILITIES OF INCREASING THE EFFICIENCY OF THE WINTER MAINTENANCE AT THE KOŠICE AIRPORT

In order to increase the efficiency and the effectiveness of winter maintenance, there should be set plans and procedures. There are number of factors that influence the implementation of changes which are designed directly to increase the efficiency of maintenance.

The main objective is primarily to ensure and to improve the quality of road surfaces and the execution of work. Secondly, it is about the optimization and the cost reduction for the winter maintenance. In our case it is about the operational costs, which are directly related to the service and to the maintenance of the airport. The quality of maintenance is difficult because of deploying the appropriate technical equipment and the use of materials. All of these factors have a major impact on improving the efficiency of maintenance and service at the airport.

4.1 Analysis of the winter maintenance process by using Gantt charts

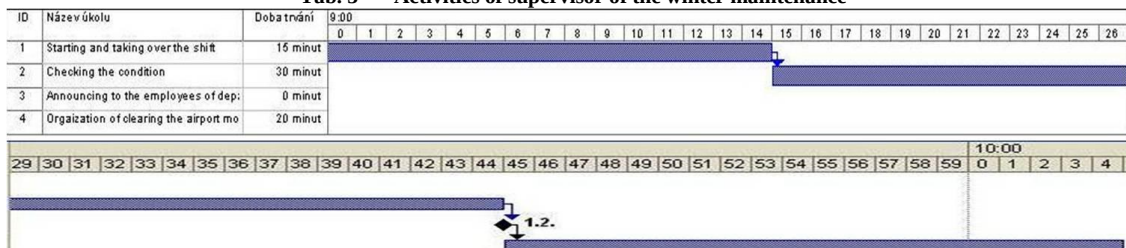
The aim of the schedule by using Gantt charts is to create a realistic plan describing the progress of the work and activities in carrying out the process of winter maintenance, taking in to consideration resources, costs, capacity, risks and so on.

By using the Gantt charts we can show the total time needed for performing the activities, their advantages, disadvantages and the possibilities of their overall improvements.

Performance of activities of supervisor of the winter maintenance:

1. Starting and taking over the shift,
2. Checking the condition of airport movement areas,
3. Announcing to the employees of departement of airport dispatching about the changes in conditions on the airport movement areas ,
4. Orgaization of clearing the airport movement areas (according to the papers).

Tab. 3 Activities of supervisor of the winter maintenance



The process of checking the condition of airport movement areas:

1. Identification of the type of contamination,
2. Preforming measurements on both sides,
3. Measure the layers of snow, ice and water,

4. Results of inspections and measurements are to be recorded in the checklist
5. Issuing NOTAM/SNOWTAM reports ,according to the results of inspections,
6. Arranging the process of work, in case of worsened condition,

Tab. 4 The process of checking the condition of airport movement area

ID	Název úkolu	Doba trvání
0		9:00
1	Identification of the type of contamination	5 minut
2	Preforiming measurements on both sides	15 minut
3	Measure the layers of snow, ice and water	10 minut
4	Results of inspections to be recorded in the ch	5 minut
5	Issuing NOTAM/SNOWTAM reports	0 minut
6	Arranging the process of work	20 minut?

The process of work in clearing the airport movement areas:

1. Plowing and suppressing the snow from the axis on one side and to the other across the length and width, forming snow mounds by plowing (the distance between the mounds should be at least 1,5 to 2 meters),
2. Consequently, carrying out clearing by plowing,

3. Adjustment of snow mounds by milling (snow mounds should have the same height as width),
4. If there is still snow on the movement areas after the milling, it is possible to plow it to the edge of the runway and subsequently getting rid of the snow mounds by milling them repeatedly

Tab. 5 The process of work in clearing the airport movement areas

[illegible]

5 SUGGESTIONS OF NEW PROCESSES AND ORGANIZATIONAL ACTIONS

The aim of the actions and processes to ensure the winter maintenance of airport is to prevent the threatening of safe air traffic and to reduce this threat. At each airport serving for civil aviation it is necessary for this purpose to develop and implement the „plan of the winter maintenance“. The primary objective is to ensure the smooth running of the air traffic even in the bad weather conditions.

By introducing new processes and organizational actions, it could increase the quality and the efficiency of the winter maintenance and also to hence the entire service in the winter. Currently, airports are forced to reduce their budgets and also to handle the increasing number of passengers. New investments are rated in terms of installation costs and also in terms of future

operational costs. To be invested in new facilities and equipment, it shall be taken in consideration the amortization period and the additional investments. Solutions may not be complicated or expensive, if they contribute, by the optimal operational features, to the significant decrease in additional investments.

Suggestion of reducing costs consists of:

- Implementing new Technologies
- Improving the qualification of the staff
- Improving work organization and management
- Improving maintainability, durability runway
- Improving the quality of services , processes, materials and equipment
- Purchase of used equipment (could save significant proportion of costs)

6 CONCLUSION

The aim of the article is to point out the effectiveness of processes in the winter maintenance at the Košice airport. Maintenance means to execute actions for a reasonable price which are required to maintain and ensure the proper service of the air traffic. Like every action also the winter maintenance generates costs and profit. The maintenance includes direct costs such as manpower, expenditures on spare parts and material. On the other hand it is more difficult to predict and quantify the profit derived from these expenditures. Every activity carried out in the air traffic has a direct impact on operational costs of the airport.

BIBLIOGRAPHY

- [1] KOLESÁR, Ján – KOŠČÁK, Peter: Učebné texty, Zimná údržba letiskových pohybových plôch, Košice: 2012, ISBN 978-80-553-0886-9
- [2] Organizačná norma ON – 08, Airport Košice, a.s.

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