

QUALITATIVE REQUIREMENTS FOR TAXIWAY "B" OF KOŠICE AIRPORT FOR USE BY AIRCRAFT TYPE B 737 800

Peter Koščák - Pavol Eliáš

In this diploma thesis I have dedicate my time to issue related to proposals of taxiway B modifications that should serve the aircrafts like Boeing 737 – 800 and Airbus A320 in near future. The taxiway does not meet the requirements needed to enable landing of such aircrafts and thus the adequate modifications should be made. Within the project I define the physical characteristics of airports set by higher authorities and specific attention is given to the standard L14.

Key words: Airport, physical characteristics, taxiway, format.

1 INTRODUCTION

Important part of any airport is well established infrastructure that must be adapted to operate at the airport. If we want to think of any development at the airport, it it's necessary to consider the capacity of the terminal and runway system. From an economics point of view is very inefficient not to use any existing area at the airport. The current state of taxiway "B" at the airport Košice can play a key role in developing this airport. The track is in a disastrous state of repair and its width and strength are poor due to the high requirements of most modern aircrafts. Since the airport is currently available only one parallel taxiway is considering options for bringing this and other taxiway which would contribute to the expansion of infrastructure and thus increase the capacity of the airport. The purpose of this work is the detailed description of these shortcomings and proposes the necessary extensive reconstruction of the runway, thereby bringing its operational capacity for larger aircraft .Reconstruction includes a number of large-scale construction needed to successfully achieve this goal. When processing the thesis I came from aviation regulations and literature dealing with the issue of airport construction and reconstruction of roads and highways.

2 AIRFREIGHT

With the shipment of air cargo is essentially began at the same time as the transport of people. The first flight made only for the purpose of cargo and mail carried in 1912 through Lufthansa. In 1914, after the outbreak of the First World War, the growth in air traffic since stopped production focused more on the production of combat aircraft. After the end of WW2 aviation began to dawn on better times for many a large number of roads were destroyed.[1] The increase in demand for air freight and lack of aviation technology forced the constructors to focus on the production of cargo planes. Significant progress in advancing aviation come the introduction of turboprops and turbojets, which increased the range of aircraft and also the speed of air transport. It is now generally new trend in the freight air transport and shipments are "door to door" which enhances the image

of the airline provides air transport client comfort. This type of service provided, for example. Companies such as DHL, Federal express or UPC.[2]

Air freight is provided in 3 forms:

- Complementary action
- Main activities of freight forwarders
- Main activities mail carriers

Distribution of air cargo:

- Product Disappearing in value in economic terms
- Physically perishable goods
- Goods for emergency planning
- Inventory management

3 MAIN CHARACTERISTICS OF AIRCRAFTS

This chapter of the thesis is devoted to the particular model of aircraft required. To be envisaged on the operation of aircraft at a particular airport is necessary to know its basic characteristics such as. Wingspan, wheelbase chassis, track chassis, the gross weight or the zoom speed.

3.1 Boeing 737

In the mid 60's, Boeing began to develop aircraft for short runs, which would be less than the Boeing 727, the aircraft received the designation 737 is a two-lane road with narrow-body aircraft. The difference between versions 727 and 737 occurs in the engine mount. While for model 727 engines were stored in the rear, the new model has them under the wings which allowed achieving a better distribution of the weight of the aircraft. [14]

Model 737 has been constructed in several variants:

- Boeing 737,
- Boeing737 – 100,
- Boeing737 – 200 (737 – 200 C, 737 – 200 QC),
- Boeing737 Classic,
- Boeing737 – 300,
- Boeing737 – 400,
- Boeing737 – 500,
- Boeing737 – 600,
- Boeing737 – 700 (737 – 700 C, 737 – 700 ER),

- Boeing 737 – 800,
- Boeing 737 – 900.

3.2 Airbus

The main reason for the need to develop a new type of aircraft or its modification was the need to compete to be Boeing's most popular aircraft Airbus 727. The aim was to design an aircraft that will be at least as well as the capacity of the Boeing - y but will have lower operating costs. This symbol has become A 320 aircraft, which was able to compete with the Boeing 737 - s Board. Due to rising oil prices in the 70s, it was necessary to pay attention to fuel consumption. A 320 was equipped with the latest technology. The aircraft was constructed of lightweight composite materials with a center of gravity of the aircraft control system using fuel. With this precision, which was spent at the plane was achieved Airbus A 320 to 50% lower fuel consumption than the Boeing 727 aircraft costing systems is developed so as to allow no easiest handling of cargo, mail or baggage of passengers.[5]

Model variants Airbus family A 320:

- A 318
- A 319
- A 321.

3.3 Compare the technical specifications of Boeing 737 – 800 and Airbus A 320

These aircraft are currently the two largest commercial aircraft in the world and among the producers is trendy much competition for since 70 years. Each of these companies maintains that it is their plane is the best. When comparing technical parameters of these aircraft is clear that apart so much different.

4 DESCRIPTION OF THE CURRENT STATE OF TAXIWAY “B” AT THE KOŠICE AIRPORT

Since 1959 the airport to Košice mixed military - civil operation. This is related to the fact that the intensity of the operating area is not as high as it is today, because it most easily used military aircraft such as. L - 29 Delfin, L - 39 Albatros and L - 140 Turbolet you often use this taxiway. During military service in the Košice airport taxiway "B" was not installed any light markings. Soldiers at that time used only portable lighting system. Following the extension of the runway of 1,100 m in the years 1974-1977 circumvent the taxiway unnoticed. During the overhaul of the runway (runway) in 1992 and with the new asphalt cover on the runway taxiway "B" refurbished and extended to a distance of 100 m from the edge of the runway. Taxiway „B“ after more than twenty years without maintenance, repairs and even got into a very bad technical state. Influence of time, climate and

thermal factors was extensive damage road surfaces. The surface is flooded large cracks, among which even in many places growing up grass and various weeds. Under the asphalt layer is about 10 cm layer of concrete of poor quality. Moreover, showing signs of inequalities, which are inadmissible in aviation? Daily axis marking and labeling whether waiting cities taxiway is significantly faded due to wear, rain and UV rays.



Fig. 1 Asphalt TWY “B”

Summary

Based on the foregoing, there is no doubt operational incompetence TWY B, which appears several weaknesses which are contrary to ICAO Annex 14 and manuals for designing airports. To ensure the then military operation, which consisted largely of lighter aircraft that was not necessary taxiways sized high resistance values? When it came to ending military operations and due to lack of funds for its reconstruction remained Taxiway "B" unused. Increase capacity and enhance this taxiway would fulfill the requirements for the use of Boeing 737-800 and Airbus A 320.V southwest side of the airport taxiway "B" is also an old military apron that served the technical equipment of aircraft to fly, which is unused. Following the extension of Taxiway would also intervene in the ramp width would be reduced by 3 m for the expansion of the taxiway. Technical condition of the ramp is similar to that in the taxiway and thus description of the work on this ramp will be identical to work on a taxiway.

4.1 Description of work needed to adjust taxiway “B” at airport Košice

Taxiway need to expand and improve its PCN from the original 25 to 55. In order to meet the target needs to be done like the following activities:

- Milling and removal of old asphalt cover,
- Removing the old unstable substrate,
- Establishing extension of taxiway about 3m,
- Excavation bed and its treatment,
- Imposition of new underlying layers,
- Installation of a new gutter,
- Installation of a new cement-concrete overall old and new, the underlying layers,

- Laying asphalt carpet,
- Implementation of a new daily marking,
- Location of new light labeling.

4.2 Milling and removal of old asphalt cover

Milling the old asphalt wearing course layer on taxiway "B" and the minor ramp action is required due to failure to provide good braking performance as well as the need to perform modifications to the underlying layer. Milling of asphalt is the process by which it is removed by the upper layer of a paved road. Performed is on surfaces that show signs of damage and security threats operation. By milling is necessary to determine the extent of damage to the top and choose the right options milling.

4.3 Removing the old unstable substrate

This activity can be done with conventional construction machinery such as barges, which are equipped with front loader bucket and rear have a hydraulic arm with replaceable blades for different widths or exchange for another business tool such as bush hammer, which is used to break down the coarse asphalt or concrete layer. This instrument can wreak numerous holes in the desired material. Disruption strength layers are greatly facilitates its removal. Removed material is necessary to export trucks for landfill construction waste.

4.4 Excavation bed customizations

Excavation work can be done on the same machine as mentioned in removing unstable substrate. Soil should be fed from the site. Excavation is done to the required depth that they can be applied sufficiently thick lower layers to fulfill its purpose and meet the conditions of load-bearing capacity. Substrate after the excavation must remain clean and straight.

4.5 Imposition of new underlay

It is a very important part of building a new taxiway. Each layer is different from that of higher meaning, function and material used. Build to adequate bearing substrate to be followed recommended technological procedures.

The underlying layers are divided into:

- Basement
- Subbase
- Base

4.6 Building a new gutter

Since the taxiway "B" does not take more than 20 years, and due to lack of funds for it have been no reconstruction is necessary to point out to the importance of good drainage taxiway. Grating proposal is realized by the nearer the runway (see Figure 1) because this is where the sewage system, which is useful. For economic reasons, it

would be disadvantageous to solve this problem and otherwise build the trough on the other side. During the reconstruction of the taxiway and build sufficient cross level according to ICAO Annex 14 to ensure sufficient runway slope and drainage of rainwater.

4.6 Installation of a new cement-concrete overall old and new, the underlying layers

To meet the required load capacity PCN 55 I propose a single-layer concrete pavement with thickness from 200 to 250 mm. For the construction of airport pavements of cement mixture must comply with regulations STN. Concrete is added essentially Portland cement 42.5 according to EN 197-1, whose suitability must be demonstrated in the tests. Before starting concreting the surface of the substrate must be cleaned from mechanical impurities and dust. In periods of high ambient temperatures it is appropriate that area and artificially moistened to prevent the taking of water from the concrete. Wetted surface is carried out so as not left on the floor puddles of water. On the cleaned surface is applied primer allowing for a more concrete connection to the substrate.

The constructions of concrete pavements relate the following activities:

- Production of fresh concrete
- Concrete delivery to site
- Redistributing concrete
- Coating, cutting and filling gaps
- Surface protection

4.6 Laying asphalt carpet

Since it is a taxiway at the airport and it is assumed the higher load causing the aircraft slow scrolling is useful type of asphalt cover, which would be comprised of asphalt concrete. This type of housing is proposed for roads with high loads and has good resistance to the formation of the tracks on the road. Min. thickness during lying of concrete is 5 cm what I propose also is used for the taxiway, in addition, there are other kinds of asphalt and it covers:

- Asphalt pavement
- Coated aggregates
- Poured asphalt.

Asphalt concrete is a mixture of dense aggregates with closed grain size, which is hot-coated with asphalt. Physic-mechanical properties of asphalt concrete are proving so. Marshall Test.

4.7 Implementation of a new daily marking

On the new asphalt-concrete taxiway must be done daily new signage. Daily taxiway marking is done in yellow. In this case it is necessary to paint a center line marking on the taxiway as defined in Regulation L14.

4.8 Location of a new light labeling

On Taxiway I need to install visual navigation aids to track gave also be used for night operation. Lights on the taxiway must be installed:

- Shaft
- Side
- Light marking

Centerline lights are lit in green and situated on the axis of the house. Max axial distance of lights is 30 m, with the exception of taxiway to quickly turn where that distance should not exceed 30 m.[2]

AUTHORS' ADDRESSES

Koščák Peter, Ing., PhD.
Rampová 7, Košice
peter.koscak@tuke.sk
Elias Pavol, Ing..
pavol.elias18@gmail.com

5 CONCLUSION

The main aim of my thesis was to approach the current state of the Košice airport, specifically on taxiway "B", which is in poor condition. Expansion and increase resistance R_d that have been specified in the work and operation of this pathway could contribute significantly to the development of airport infrastructure, which would allow extended operation on 2 currently the world's largest commercial aircraft. In service of this pathway for these aircraft types would contribute not only to transport passengers as well as air cargo. Real interest in cooperation in this regard in the case showed a significant increase in capacity Cargo Company. Among other things, Košice airport had two parallel taxiways on both sides of the runway. This would allow taxiing aircraft on the stands of the south- western part, thereby reducing aircraft runway occupancy time and increase the capacity of the runway system. Regarding corrections Taxiway "B" and the potency of the development of air freight to the Košice airport would be very appropriate to revise the technical condition of the southwestern stalls is adjacent to the taxiway. Like the house and stand by the stage decay. Its extension, which could be achieved by removing the built rampart, and increase capacity in the future could provide a good basis for the construction of the missing Cargo Terminal at the Košice airport.

BIBLIOGRAPHY

- [1] PRUŠA, Jiří a kol. World aviation. Košice: TU, 2008. 321 s. ISBN 978-80-8073-938-6
- [2] KAZDA A.: Airports, design a operation, VŠDS Žilina, 1995. 377 s. ISBN 80-7100-240-2
- [3] Airport Košice
- [4] KOŠČÁK. P., FERENC, J.: Organization and management of airport operations, 2010. 183 s. ISBN 978-80-553-0356-7
- [5] ROZENBERG, R. – SZABO, S.: Civil and transport aircraft 1, LF TU Košice, 2013
- [6] KRLIČKOVÁ, E. – VINCLEROVÁ, S.: Construction of roads and motorways: Part 1 – Road and building materials. Košice: Mercury – Smékal, 2003. 59 s. ISBN 80-89061-87-7