



PROBLEMATICS OF AIR TRAFFIC NOISE AROUND TRENČÍN AIRPORT

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Abstract

The choice of the topic reflects long-term need of municipalities around the Trenčín airport to handle the situation regarding noise exposure from air traffic. The main goal of the thesis is to evaluate and to design optimal flight procedures and practices to decrease noise pollution in the vicinity of the airport. In thesis we analyze public and flight crew and airport operator opinion from multiple points of view. We compare the perception of the public, their social situation to the present air traffic operations and flight practices. The thesis includes analysis linked to the by-laws, regulations and standards and recommended practices on Public Health Authority of Slovak Republic and European union legislation with respect to public noise regulations, flight rules, air law, flight safety and aircraft noise certification. We compare the issue to similar examples of noise restrictions abroad.

Keywords

Aircraft operation, Traffic noise, Flight procedures, Noise reduction, Public opinion, Airport design

1. INTRODUCTION

In recent years, residents in the vicinity of Trenčín Airport have increasingly complained about increased traffic and thus increased environmental noise pollution from flight operations. At present, the airport is mainly used for the needs of aircraft repair shops, the Armed Forces of the Slovak Republic, the air ambulance service, private flight schools and the aeroclub. Trenčín Airport has historically had an important position in its area. In the past, the Trenčín Air Repair Works was one of the largest employers in the region. In this period, the airport was responsible for an incomparably higher number of aircraft sorties than at present. There were very few public complaints about noise from flight operations in those times. Numerous complaints from residents of the surrounding villages started to come in from 2010. People cited noise from aerobatic flying and noise from aerotow aircraft as the main reason for complaints.

To date, noise has been dealt with at the municipal level, without significant interference with air traffic. To date, there has been no wide-ranging and comprehensive public opinion survey to define more precisely the main reason for the complaints. The aim of this thesis is to analyse the source of noise, the needs and dissatisfaction of the inhabitants. This thesis summarizes the important points of the issue and provides suggestions and recommendations for partial reduction of the noise burden.

2. CURRENT LEGISLATION OF THE SLOVAK REPUBLIC IN THE FIELD OF NOISE

The basic legal framework in the Slovak Republic for the establishment of details on the permissible values of noise, infrasound and vibration in the environment, and on their requirements for objectification, is the Decree of the Ministry of Health of the Slovak Republic No. 549/2007 Coll., No. 549/2007 Coll., No. 549/2007 Coll [1].

3. AIRPORT TRENČÍN

3.1. History and present

Trenčín Airport has historically played an important, not only strategic, but also social role in the Central Povazie region. It was founded in 1938. At the time of its greatest boom, the state-owned company Aircraft Repair Works Trenčín employed several thousand employees in various positions requiring a wide range of highly skilled and highly specialised personnel for the aviation and armaments industries. The factory also included a secondary vocational school of aerospace engineering, whose graduates found direct employment in the industry. The work associated with light and heavy maintenance of various types of aircraft has always been associated with a lot of ground and flight testing and sorties [2].

Currently, the main types of aircraft repaired at the Trenčín Aircraft Repair Plant include Mi-8/17/171 helicopters, L-39 jet trainer aircraft and L-410 transport aircraft. In 2021, an extensive modernisation of the main aircraft repair hangar was completed, which may mean a potential increase in the capacity of repaired aircraft in the future [2].

4. FLIGHT OPERATIONS AT TRENČÍN AIRPORT

The airport is equipped with two runways, one of which is a concrete runway and the other a grass runway. Concrete runway 04/22 with a length of 2000 metres is mainly used for the needs of the Slovak Army and training flights of flight schools operating at this airport. The grass runway 03/21 with a length of 1000 metres is mainly used by the Trenčín Aero Club for recreational and gliding flying.



Figure 1: VFR map of Trenčín Airport [3]

5. THE CURRENT SOLUTION TO THE PROBLEM

Trenčín Airport does not currently have any official published procedures to reduce noise in the vicinity of the airport.



Figure 2: LOTN [4]

The only, officially unpublished, restriction of the airport is a ban on aerobatic flights on Sundays, public holidays and public holidays. Notice TWR/10B/2017 is dated 06/26/2017. It comes into force on 1 July 2017 and until revoked, the aerobatic aircraft flying ban at Trenčín Airport is issued on Sundays, public holidays and public holidays. On weekdays and Saturdays, aerobatic aircraft operations are permitted between 08:00 and 18:00 LOC [5] [6].

6. OPERATORS

Private aircraft operators and flying clubs based at Trenčín Airport currently account for the largest part of the movements. The activities of these entities are mainly focused on the provision of both commercial and non-commercial services such as pilot training, aircraft rental, aerotaxi, aerial work and adventure flights. An important company-wide role is played by

the air ambulance service. Most of them have a long-standing presence at Trenčín Airport.

7. THE MOST FREQUENTLY OPERATED AIRCRAFT TYPES

The following table shows the types of aircraft that are most frequently operated at Trenčín Airport. These are single-engine piston, twin-engine piston and twin-engine turboprop aircraft of various orientations. The table is aimed at comparing each aircraft in relation to the highest noise level generated during take-off mode together with the permissible noise values for the aircraft category.

Table 1: The types of aircraft that are most frequently operated at Trenčín Airport [7]

Typ lietadla	TCDSN	Motor	Vrtuľa	MTOW (kg)	Vzletový režim dB (A)	
					Level	Limit
Z-142	EASA.A.027	M337 AK	V 500 A	1090	72.4	74.5
Z-43	EASA.A.028	M337 AK	V 500 A	1350	77.7	78.0
Z-526F	EASA.A.353	M137 A	V 503 A	975	78.2	82.9
Z-226 MS	EASA.A.353	M137 A	V 503 A	890	81.6	81.6
C-162	C2079 10(10.4a)	O-235-L2C	1A 103/TCM6958	758	66.8	79.3
C-172	C5727 10(10.4a)	O-320-D2J	1C 160/DIM7557	998	75.8	83.8
DA-20 A1	EASA.A.223	Rotax 912 A3	HO-V352F-170FQ	730	64.8	78.8
DA-40	EASA.A.022	IO-360-M1A	MTV-12B/180-17	1200	78.7	81.5
DA-42	EASA.A.005	2xTAE 125-01	2xMTV-6ACF/CF187-129	1785	76.8	88.0
L-200A	EASA.A.043	2xM337 SH	2x410(A)T	1950	**	**
A-109K2	EASA.R.005	Armal 1K1	2 x rotor	2850	91.7	94.6
EC-135 P2-	EASA.R.009	PW206B2	2 x rotor	2950	88.6	94.7
L-410 UVP E20	EASA.A.026	M601 E-21	V 510	6600	85.4	88.0
EA-300L	EASA.A.362	AEIO-540	MTV-14BC/C190-17	950	77.3	82.5
Z-50M	EASA.A.108	M137.AZ	V 503 A	700	**	**

The most frequent operating aircraft types at Trenčín Airport and their noise level comparison according to TCDSN [7]

All aircraft operated according to Table 1 meet the noise limits of Annex 16, VOLUME I, and thus do not violate international standards.

8. CURRENT SOCIAL SITUATION

According to the Trenčín Aircraft Repair Works, the most complaints related to noise from flight operations have been recorded from the municipalities of Trenčianska Turná and Trenčianske Stankovce, among the towns and villages around the airport. The inhabitants of these villages started to actively express their opinion in public groups on the social network Facebook. The most frequent complaints were noise from aerobatics and noise from aerotow aircraft. People were most unhappy about noise from flight operations on Saturdays, weekends and holidays. These are the days when the number of flights from Trenčín Airport is the busiest. The bulk of the activity is associated with leisure flying. Consequently, recreational, sport and pilots-in-training used their days off mainly for this kind of recreation.

9. COOPERATION WITH STAKEHOLDERS

As a first step, the airport operator, Letecké opravovne Trenčín, akciová spoločnosť, was contacted. After an initial e-mail communication and a subsequent telephone contact, a first personal meeting was held with the CEO, Mr Ing. Juraj Lauš. At the initial meeting, the structure of the thesis and the expected objectives were presented to Mr. Lauš. He was very supportive of the idea and expressed his full support, patronage and cooperation in the development of the thesis. Mr. Ing. Lauš

described the issue from the airport operator's point of view, the current situation within flight operations and also defined the most problematic places around the airport, from which the greatest number of complaints come from. These are the municipalities of Trenčianska Turná and Trenčianske Stankovce.

The telephone numbers of the mayors of the aforementioned municipalities have been traced via the official websites.

After an initial telephone contact and a brief explanation of the issue, we accepted an invitation to a personal meeting, which took place at the municipal office of the municipality of Trenčianska Turná. The meeting was attended by the mayor of the municipality of Trenčianska Turná, Mr Ing. Peter Mikula and the Mayor of Trenčianske Stankovce, Mr. JUDr. Martin Markech. At the beginning the basic objectives of the thesis were explained. Afterwards, a discussion on the topic took place in which the mayors of both municipalities expressed the long-term need to address the situation. Both of them unanimously confirmed the mass complaints of the inhabitants, especially during weekends and weekdays. At the same time, both are aware of the socio-economic benefits of the airport for the region, whether in terms of repair activities, strategic importance or leisure activities.

10. RESULTS OF THE QUESTIONNAIRE

According to the results of the questionnaire, the return rate of questionnaires was 61% from the municipality of Trenčianska Turná and 39% from the municipality of Trenčianske Stankovce. From the supplementary question, it can be stated that noise nuisance as a rule bothers more the inhabitants of the streets that are closer to the airport. 76% of the respondents have lived in their current place of residence for more than 10 years. Which did not support the theory that newly arrived residents are more susceptible to noise. According

to the results, noise is particularly bothersome to people who have been in the home for a long time or are unemployed, retired or housewives. Noise in the outdoor environment bothers most of the respondents. Air traffic bothers residents especially on Saturdays, Sundays, public holidays and public holidays. Noise is perceived as most disturbing by those without children or parents with children aged 6-12.

11. LAST NOISE POLLUTION MEASUREMENT IN THE VICINITY OF TRENČÍN AIRPORT 2021

On the basis of repeated complaints of residents living around Trenčín Airport and the subsequent suggestion of the Regional Hygienist Žilina, Office of the Chief Hygienist of the Ministry of Health of the Slovak Republic, No. 19466/2020/UVHR/71553 of 17 September 2020, the operator of Trenčín Airport ordered the measurement of the noise load in its surroundings. The measurement was carried out by the testing laboratory EUROAKUSTIK, s. r. o., Letisko M. R. Štefánika 69, Bratislava. The measurement was focused on the noise impact of the operation of aeroplanes during aerobatics training, for the requirements of the Act of the National Council of the Slovak Republic No. 355/2007 Coll., on the protection, promotion and development of public health and on the amendment and supplementation of certain acts, as amended.

For the purpose of the measurement, usually used aircraft for aerial acrobatics were deliberately selected. These aircraft are CAP 231, Zlín Z-50M, Zlín Z-142 and Zlín Z-526F. Most of them can be found in Table 2.

The test laboratory protocol No: SLE-200607/AK dated 28.06.2021 fully confirms compliance with the applicable legislation for aerobatic flight operations. At none of the six objectification points, including measurement point M3, were the permissible values of the determining variables exceeded in the reference time period of day and evening. The reference time period night was excluded because the monitored sound sources are not operating. [8].

12. RECOMMENDATIONS FOR NOISE REDUCTION AROUND TRENČÍN AIRPORT

VFR noise procedures - We propose to define arrival and departure VFR routes, which will be subsequently published to the aviation public via the Aeronautical Information Guide of the Slovak Republic (AIP SR). The aim of such routes is to ensure as far as possible that arriving and departing aircraft are routed away from populated areas and to draw the attention of pilots to places to avoid and thus reduce the noise pollution of the population. Such routes also include the need to use optimum flight regimes to reduce noise.



Figure 3: Departure tracks for runways 21 and 22 [9]



Figure 5: Arrival tracs for runways 03 and 04 [9]

12.1. Definition of an alternative flight box for aerobatics:

For the purpose of aerial acrobatics, the defined airspace already mentioned in this thesis is used. This box is located immediately above the aerodrome near the village of Trenčianska Turna. An alternative is to mark out a second flight box. In case of intensive training, two will be available, which can be alternated and thus the noise load can be distributed.



Figure 4: Alternative acrobatic box [9]

12.2. Defining noise restricted areas:

We propose to define noise restricted areas beyond the flying rules, which the pilot is obliged to avoid in case of local activity or overflight of Trenčín Airport. Such an area would extend from the ground to 2500 ft AGL, which is a prerequisite for noise abatement. Our recommendation is the areas over the villages of Trenčianska Turna, Trenčianske Stankovce and the Juh housing estate.

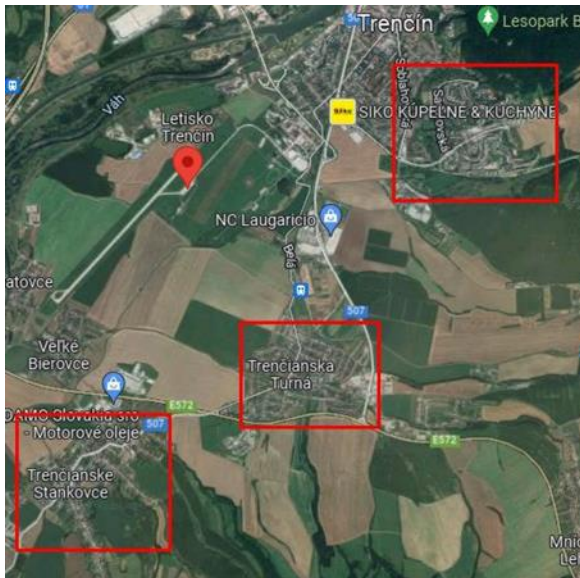


Figure 6: Noise restricted areas [9]

12.3. Adjustment of the permitted flight time for aerobatics:

Currently, aerobatic aircraft are prohibited to fly at Trenčín Airport during Sundays, public holidays and public holidays. On weekdays and Saturdays aerobatic aircraft operations are permitted between 08:00 and 18:00 LOC. We propose to amend such prohibition as follows. On weekdays and Saturdays, allow aerobatic aircraft operations from 09:00 to 17:30 LOC with a mandatory break between 11:00 and 13:00 LOC. Such a mandatory break will create space for a quiet lunch break for the residents of the airport vicinity. Such an arrangement could be partially relaxed with the agreement of the municipalities.

12.4. More active use of gliders' winch take-offs:

Winch take-offs of gliders are a common practice in gliding both at home and abroad. The Trenčín Aeroclub, as the only operator of gliding at the Trenčín airport, also has a winch in its equipment. Take-off with the help of a winch has undeniable advantages. First of all, it is a cheaper method of take-off compared to towing aircraft. Secondly, a shorter interval between two consecutive glider take-offs is ensured. In other words, there is no need to wait for the tow plane to return from the previous aerotow.

13. CONCLUSION

It is necessary to underline the fact that Trenčín Airport with its current number of movements is far behind the historical data. For continuous noise monitoring, it would be necessary to meet the requirement of at least 50 000 movements per year in accordance with Act 355/2007 Coll. on the Protection, Promotion and Development of Public Health and on Amendments and Additions to Certain Acts. At present, the number of movements is calculated at a maximum of two thousand per year. Even in the case of aerial acrobatics, the noise limits have not been confirmed by measurements to be exceeded. It should be noted that aerobatics training is carried out occasionally, several times a year. In order to take into account the real disturbance to the public, there would have to be 30 such flights per day. It can therefore be concluded that the occasional disturbance caused by aerobatic flights may be a nuisance, but is not subject to a total ban. Both direct and indirect methods have been proposed to reduce noise, which may help not only to reduce noise in the vicinity of the airport but also to increase the popularity of aviation.

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