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MONITORING AND CONTROL TECHNICAL MEANS USED IN AIRPORT INFRASTRUCTURE BASED ON GNSS

This article discusses the principles of construction of a centralized monitoring and control of technical equipment used in airport infrastructure based on GNSS what is responsible for monitoring and controlling the flow of fuel and lubricants by terrestrial means

Introduction

Today, the development of science knowledge in areas such as computer science, radio navigation, electronics, photogrammetry, geodesy, cartography allows you to create a closed system of monitoring and control facilities (hereinafter - SMCF). To create SMCF across the land requires considerable expenditure of money and time resources, but the growth of world economy and the industry can make this system available for use in the scale of individual airports today. The concept of introducing SMCF designated documents ICAO [1]. Introduction SMCF will significantly reduce the risks specified in [2] (chapter 18, paragraph 18.1.4 subparagraphs: a, d, f-q). Consider the fundamental structure and purpose, which are solved by SMCF:

1. Composition of SMCF:
- a navigation equipment [3], mounted on each movable component of system;
- a database describing the objects in the system, a set of constraints, rules, priorities;
- a three-dimensional map of the airport, which includes at least:
    - layer Road with a count;
    - layer of buildings;
    - layer of Wildlife;
    - terrain layer;
- center of automatic decision to create a set of rules and restrictions of movement of objects in real time;
- a system of visual aids and blocking access;
- the server for exchange of information;
- control center;
- a system of self-control and validation;
- reserve system.

2. Objectives of SMCF:
- ensuring safe interaction between objects in the vicinity of the airport in real time;
- construction traffic routing of all objects in general, and each object separately in real time;
- control over the use of technical means (hereinafter - TM) at the airport;
- Monitor the use of the TM to the airport;
- conduction of analytical studies to improve the airport infrastructure, improve safety;
- cost savings due to optimal routing, logistics execution rules;
- reducing the human factor in traffic management in the area of the airport.

SMCF stages of implementation for the purposes of checking the flow lubricants TM

Due to the lack of legislative basis in Ukraine based on the use of SMCF onGNSS. Its implementation requires some preparation, which consists of several stages:

1. Creating a database with a description of the TM system, which must contain at least:

- a unique identifier for each TM (such an identifier can be obtained as follows: if there is a public TM shall be based on numbers it had in his absence - this number ceases unique inventory number to the company (can be changed over time);
- the mark of TM;
- model of TM;
- modification of the TM (can be changed over the time);
- the amount of motor TM (can be changed over the time);
- the type of fuel used;(can be changed over the time);
- securing additional equipment (can be changed over the time);
- the charging person and its data (can be changed over the time).

2. Measurements of rates of consumption of fuels and lubricants (FAL), each individual type of equipment, (it should be understood under the guise of a combination of different combinations of make, model, modification of the motor TM).
3. Creating a unified scheme of calculation consumption rates TM based on individual vehicle [4], [5], [6].
4. Create a single database storing information on the work performed TM (mileage, used motor-hours worked moto-hours of additional equipment, other features of TM).
5. Monitoring daily delivery vehicle traffic logs.
6. Develop mechanisms for comparing the SMCF and information from a single database trip tickets.
7. Installing SMCF all vehicles involved in the system.
8. Daily monitoring of vehicle use on the basis of the mechanism referred to in paragraph 7.
9. The permanent development and improvement of the mechanism referred to in paragraph 7 on the basis of information obtained during the operation.
10. Implementation of logistics software to optimize TM routing involved in the system.
11. Control definition functional responsibilities of all objects with respect to the planned work of analysis differences.
12. A comparison between the planned logistics data and actual TM systems and SMCF (Fig. 1).

The experimental results

The introduction of elements of the SMCF at 35 enterprises of Ukraine for 1405 TM has allowed assess of the effectiveness of such a system:

- an introduction to the work items 1-6 allows you to save up to 10% of the total fuel used by TM;
- introduction to paragraphs 7-10 allows you to save up to 50% on the amount of fuel used by a separate TM and up to 25% of the total FAL used by the TM. For some the size of the TM fuel economy by 100% - was prevented use of a dummy TM.
- an introduction to the work saving of paragraphs points 12-11 to 7% of the total fuel used by TM;
- introduction to paragraph 13 allows the monitoring, evaluation, control of the TM. Using this scheme allows for a total of up to 42% fuel savings and more on the use of the entire fleet.

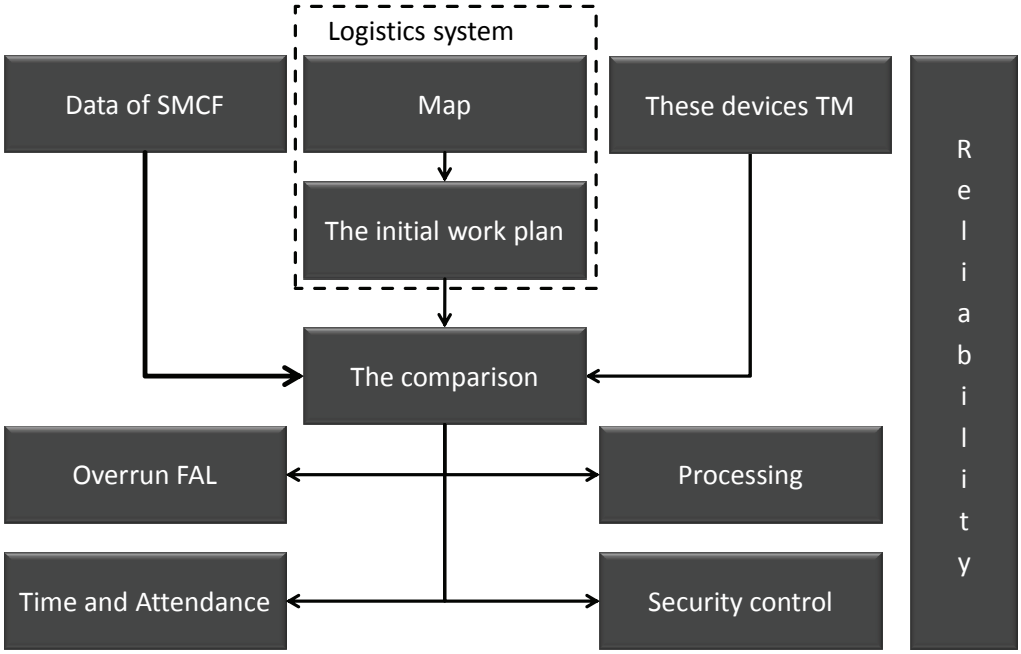

Figure 1 - Scheme of comparing planned and actual performance TM

Analysis of experimental results, conclusions

Introduction of SMCF can take a new level in the management of fleet TM. Among the reasons identified by us as a result of the experiment, the main ones are: dishonesty, irresponsibility of employees responsible for the work of the TM. It is important to note that the experiment was carried out on workers with different levels of wages and different corporate cultures, it was found that the above does not affect the pattern of behavior of employees. Payback system is highly dependent on the total number of operations performed by fleet vehicle, the scheduling algorithm works TM algorithm comparisons, the model revealed damage compensation. In general, the payback period can range from several days to several months.

References

1. International standards and Recommended practice (SARPS). Aeronautical telecommunications annex 10to the convention on international civil aviation, ICAO, 1996.

2. International standards and Recommended practice (SARPS). Safety Management Manual (SMM). Doc.9859 – AN/460. ICAO, 2006.

3. V.V. Konin, V.P. Kharchenko – Satellite navigation systems – Kyiv, Holteh, 2010. – 520p.

4. Наказ міністерства інфраструктури України від 24 січня 2012 року N36 «Про затвердження змін до норм витрат палива і мастильних матеріалів на автомобільному транспорті»

5. Наказ міністерства транспорту України від 10 лютого 1998 року N43 (із змінами)

6. ДБН Д.2.7-2000 «Ресурсні кошторисні норми експлуатації будівельних машин та механізмів» затверджений Наказом Держбуду України від 05.10.2000 № 225