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MULTIPARAMETER ASSESSMENT OF INTROSCOPE'S OPERATORS ACTIVITY

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ABSTRACT

The main feature of activity of an operator of X-ray introscope is that it is carried out not with a real object, but with its information model. The authors propose a variant of a multiparameter evaluation of professional work of an operator- introscopist taking into account perception specificity of visual information from the monitor screen. This method facilitates the creation of certification programs, conducting tests of knowledge in the field of transport safety, as well as the choice of evaluation criteria and principles of simulation of training tools.

ENGLISH SUMMARY

Background. *In the conditions of a real threat of terrorist acts, ensuring transport safety remains a high priority.*

Objectives. *The study is to establish criteria of multiparameter assessment of introscope» operators in civil aviation.*

Methods. *The authors use statistical analysis of data, training contents, skill requirements.*

Results. *Analysis of statistical data on types of transport does not show any tendency to reduce the number of acts of unlawful interference (AUI) in transport activity (Pic. 1) [1–4].*

The increase in the number of AUI is most vividly demonstrated on the example of air transport when passengers try to carry on the aircraft dangerous substances and articles. Thus, in 2012 49 million people were checked, while 68 thousand violations of transport safety were prevented (Pic. 2) [3].

The main element in the overall inspection system naturally became a specialist working on X-ray television introscope.

In accordance with the rules of the preflight and post- flight inspections worker of a control group (inspection specialist № 3) defines the contents of the things according to their shadow images on the screen of X-ray television introscope, stops the conveyor when he detects dangerous substances and articles, let the senior official of inspection zone and law enforcement official know about this fact, makes a decision on withdrawal of dangerous substances and articles and admission of things of the passenger to the sterile zone [5]. However the rules determine that continuous monitoring of one specialist should not exceed 20 minutes with a break of at least 40 minutes, so during the entire shift in the inspection zone there is a rotation of people in their workplaces.

Importantly, the issues of training of X-ray television introscope operators are relevant to other modes of transport. In particular, by the end of 2013 it had been planned to put into operation inspection zones at 35 railway stations and over 180 introscopes were bought and training and certification of specialists was organized.

The RF Government Decree of 06.08.2013, № 670 provides for the development of rules for checking the conformity of persons belonging to civil aviation personnel, who aim to obtain certificates, which make it possible to perform professional functions [6]. Such persons should include inspection specialists working with introscopes.

Important elements of the training system of X-ray television introscope operator are criteria for evaluation of his activity in the interpretation of X-ray image.

The guide to aviation security to assess the ability of the X- ray television introscope operator to recognize dangerous substances and articles on the X-ray image while checking passengers' luggage, recommends conducting an examination using a variety of items, including several restricted and prohibited for carriage, in addition to images of «pure baggage». The period of time allowed for the interpretation of the images should be comparable with the duration of a real inspection. [7]

In addition, the guide provides recommendations on the application of methods to assess the operator's ability to interpret X-ray images. These methods include: silent testing (penetration testing), projection of dangerous item image and testing with computer illustrations.

The main feature of the X-ray television introscope operator's activity is that it is carried out not with a real object, but with its information model. Information model is a source of information, using which the inspector evaluates the situation and makes decisions [8–9].

Based on the above, criteria for evaluation of effectiveness of X-ray television introscope operator should be:

*• frequency of right interpretation (P *) – the correct determination that an X-ray image contains prohibited items (signal about the «threat");*

• *frequency of errors (Ro) – signal «about the threat « from the image, which does not contain prohibited items («false alarm»);*

• *time required for detection (T) – the time spent by the operator to process one piece of luggage.*

P, Po and T depend on factors, contained in information model:*

• *the total number of elements in the information field (N) – the number of the inspected objects in the luggage of a passenger*

• *operational amount of information field (Z) – a specific number of dangerous substances and articles in the baggage*

• *complexity of information field (M).*

The complexity of the information field M is influenced by such factors as (Pic. 3–6):

• *color image of the object (C);*

• *geometric image of the object (G);*

• *orientation of the object (Y);*

• *overlay image (W);*

• *complexity of the object (R).*

The authors provide certain formulas with the abovementioned indicators (see (1) – (4)). Table 1 shows expert evaluation of factors C, G, Y, W, R, affecting the complexity of the information field.

Conclusions

Using this method, it is possible to develop programs for the certification of X- ray television introscopes operators based on the multiparameter evaluation of their professional activities, taking into account peculiarities of perception of visual information from the monitor screen. Option of a multiparameter evaluation of the operator`s activity based on practical experience on X-ray television introscopes is given in Table 2.

Keywords: civil aviation, transportation, aircraft, airport, introscope operator, information model, information field, multiparameter evaluation.

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Статья поступила в редакцию / article received 16.10.2013
Принята к публикации / article accepted 14.12.2013