

IMPROVEMENT OF OPERATIONAL MANAGEMENT OF HYGIENE AND LABOR SAFETY ON THE BASIS OF ASSESSMENT OF OCCUPATIONAL HAZARD

Abstract: The purpose of the work is to provide grounds for the approach to the occupational hazard assessment. To complete the purpose, it is proposed to analyze the existing methods and approaches to the occupational hazard assessment and an approach to the occupational hazard assessment is proposed, which is based on the use of statistics on occupational injuries rates. The necessity of application of information systems for occupational hazard assessment is emphasized.

Keywords: hygiene and labor safety, occupational hazard, operative management, planning, information system.

Articulation of issue

The process of adaptation of the Ukrainian legislation on labor protection to European and international legislation is underway, and the use of world scientific and practical experience and deepening of international cooperation in the field of labor protection is intensifying. In order to create a national system for preventing occupational hazard, the “Concept for Reforming the System of Labor Protection Management in Ukraine” [1] has been developed to ensure the effective implementation of workers' rights to safe and healthy labor conditions. Implementation of the Concept will ensure the formation of a new national system for prevention of industrial risks by introducing a risk-oriented approach in the field of occupational safety and health at the legislative level.

Analysis of recent research and publications

As evidenced by the analysis of scientific works, operative management of labor protection during the development of measures to reduce occupational injuries is performed on the basis of an analysis of the causes and types of events that led to accidents, considering the data on the circumstances of accidents and data on the victims [2, 3, 4]. Standards of the OHSAS series are designed to provide elements of an effective system for managing occupational hazard. These elements can be integrated with other management requirements. They can assist organizations in achieving hygiene and safety objectives and can also be used to determine economic outcomes.

Purpose of work

To conduct research on the main methods of assessment of occupational hazard and to develop and substantiate the approach to the risk assessment of an occupational accident for the practical use.

Presentation of the main material and research results

The State Standard of Ukraine DSTU OHSAS 18002:2015, adopted in Ukraine, sets requirements for a safety and health management system (SHMS) to enable the organization to control the hazard connected with occupational safety and health [4]. Organizations and enterprises of various types of economic activity are increasingly interested in achieving good results in the field of hygiene and safety, through the active use of methods for managing occupational hazard. At the same time, even modern methods of occupational hazard management cannot be sufficient and effective if they are not integrated into the overall system of enterprise (organization) management.

Implementation of SHMS at enterprises, developed with consideration of the requirements of the State Standard of Ukraine DSTU OHSAS 18002:2015, ensures the following: implementation of national laws and regulations; proper organization of all types of work on occupational safety; risk reduction for occupational accidents and diseases; reduction of expenses related to labor protection (including – punitive sanctions). In accordance with this standard, the basis of the SHMS should become the identification and assessment of the risk of occupational accidents and diseases. Evaluation of the results of activities with consideration of the occupational hazard assessment can become an effective motivating factor in stimulating the owners of enterprises in performing activities aimed at creating safe and harmless labor conditions.

The transition to a SHMS, based on the occupational hazard assessment, necessitates appropriate scientific developments. Despite a sufficiently large number of hazard assessment methods, they cannot be considered acceptable for the enterprise of any particular type of economic activity. At the same time, the analysis of existing methods and approaches to the estimation of occupational hazard allows us to conclude that it is necessary to adapt them to the characteristics of enterprises considering their branch affiliation (type of economic activity) and further substantiation of management decisions on hazard level reduction.

The assessment of the risk of injury is proposed to be conducted with consideration of the probability of an accident occurrence and assessment of its consequences. Such an approach to the occupational injury assessment is calculated as the product of the probability of occurrence of the occupational injury event and the extent of the expenditures inflicted (in value terms). The peculiarity of this approach is that it proposes the possibility of comparing the indicators of the frequency of fatal and non-lethal injuries.

The occupational injury risk assessment is based on the identification of the main factors that affect the safety of the production most. According to research results, algorithms designed to analyze the safety of production based on procedures for calculating occupational hazard levels can be developed. Practical implementation of such algorithms is possible with the use of specialized computer programs that allow automating the calculations of the probability of emergencies, hazardous situations, occupational accidents, to determine the risk of these events for staff.

In modern conditions, operational hygiene and safety management approaches are more effective, based on the use of data not only of a particular enterprise, but also of other enterprises belonging to the same type of economic activity. The calculations are performed on the basis of factors determined by a priori analysis. In the future, there is a possibility of transition to the development of corresponding mathematical models that will allow modeling the dynamics of occupational hazard indicators, and modeling results will provide grounds for the plan of operational measures regarding labor safety. When planning preventive measures on the basis of the calculated risk indicator, first of all, such measures shall be chosen that must provide the greatest socio-economic effect at the lowest cost.

It is proposed to calculate the risk that one employee (of specific profession) of the company (of specific type of economic activity) will suffer an accident R_H with temporary disability by the formula:

$$R_H = P_H \cdot K, \quad (1)$$

where P_H – the probability that with one employee of a given profession in this type of economic activity in a year, one accident may occur with different material losses for a certain period;

K – coefficient of disability, with consideration of the number of lost working days in the total amount of working days worked in this profession of this type of economic activity for the same period.

The introduction of the coefficient K for the further calculation of the overall risk of an accident with various material losses – from an accident without loss of working days (transfer to light labor) to a complicated one makes it possible to objectively account for these differences.

The probability that one worker per year may experience one accident with different consequences is calculated by the formula:

$$P_H = 1 - e^{-\lambda_H}, \quad (2)$$

where λ_H – the frequency of an accident with a disability for a given profession in this type of economic activity during the year.

The coefficient of loss of labor ability, with consideration of the number of lost working days in connection with accidents in the total amount of working days worked for the same period, is calculated by the formula:

$$K = \frac{D_{CP}}{C_{CP}}, \quad (3)$$

where C_{CP} – the average annual number of employees in this type of economic activity;

D_{CP} – the average number of lost working days as a result of temporary disability of employees of the profession in this type of economic activity.

In practice, after receiving all the necessary data, the calculation of an accident risk is performed. In the event that it is higher than the average in the main type of economic activity, it indicates the need for preventive measures.

However, the practical implementation of the proposed approach requires the availability of specialized information systems and up-to-date databases on occupational injuries. As an example of the occupational hazard assessment, consider using the information system [5]. Initial data entry is entered, with further occupational hazard calculation for each event and the subsequent ranking of events by reducing the amount of hazard is automatically performed (Figure 1).

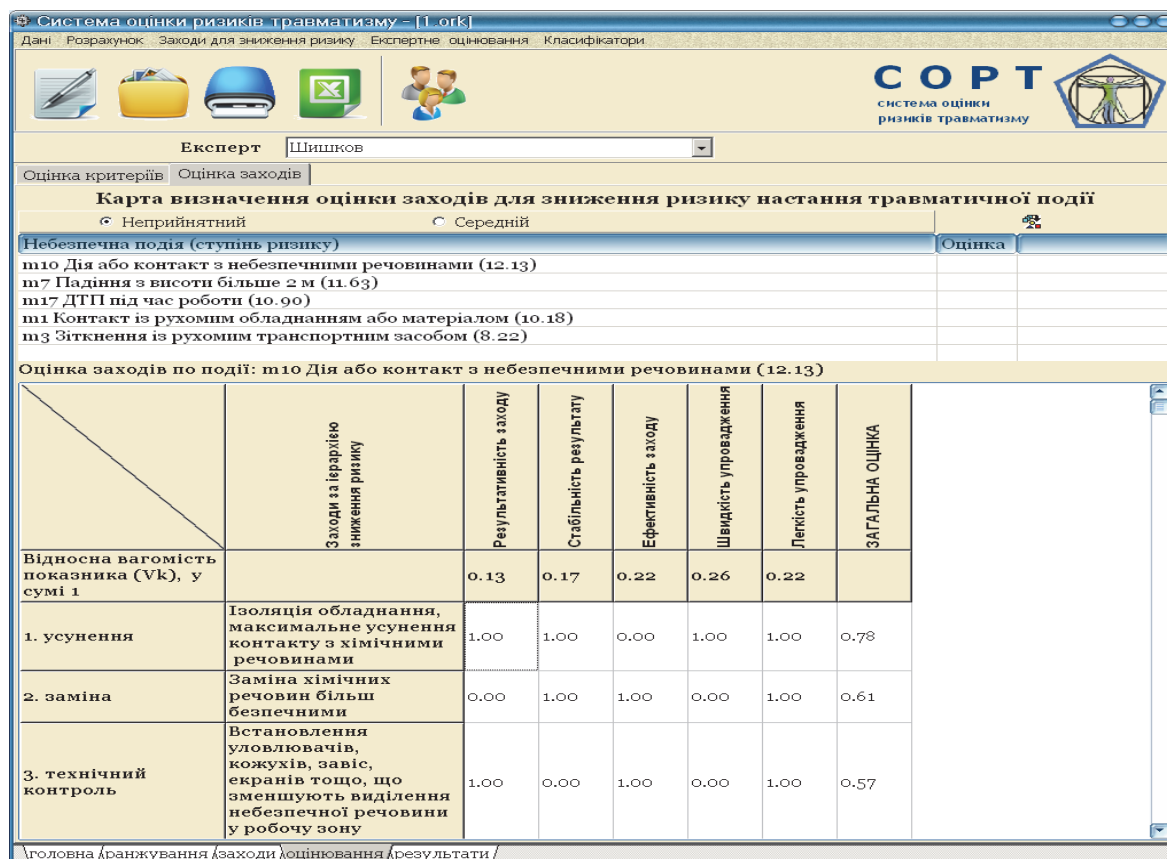


Fig. 1 – Information system of occupational hazard assessment

Upon forming arrays of activities, their grouping by the level of risk is performed. Formation of a set of measures for risk level reduction is performed separately for each group. The measures are entered manually or by copying from the corresponding electronic documents. Subsequently, their expert evaluation is performed.

Conclusions

The basis of reasonable planning and implementation of effective preventive measures is the identification of dangers existing at work and an adequate occupational hazard assessment. However, the hazard assessment process, as the basis for the hygiene and safety management system, requires a complex of scientific research. Hazard assessment should be based on the sectoral affiliation of enterprises (type of economic activity). An approach to the estimation of occupational hazard

is proposed, which is based on the use of statistics on indicators of occupational injuries. The necessity of application of information systems for occupational hazard assessment is emphasized.

The result of the implementation of a risk-oriented approach in the field of occupational safety and health should be the increase of the labor safety level, prevention of emergencies and accidents, the reinforcement of the occupational injuries and occupational disease prevention.

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