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WORKPLACE RISK ASSESSMENT SOFTWARE

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Анотація

У роботі розглянуто розробку програмного забезпечення для оцінки ризиків на робочому місці. Описано функціональні можливості такого програмного забезпечення, що дозволяє автоматизувати процес ідентифікації небезпек, оцінки ризиків та вироблення заходів для їх зниження. Висвітлено важливість застосування програмного забезпечення для покращення безпеки праці та зменшення нещасних випадків на виробництві.

Ключові слова*: програмне забезпечення, оцінка ризиків, охорона праці, безпека на робочому місці, автоматизація, нещасні випадки на виробництві.*

Abstract

The paper examines the development of software for assessing risks in the workplace. The functional capabilities of such software are described, which allows automating the process of hazard identification, risk assessment, and development of measures to reduce them. The importance of using software to improve occupational safety and reduce accidents at work is highlighted.

Key words: *software, risk assessment, occupational health and safety, workplace safety, automation, accidents at work.*

Introduction

In the conditions of modern production, issues of occupational safety [1-9] and health protection [10-12] of workers are becoming more and more relevant. An effective occupational health and safety management system at the enterprise is the key to reducing industrial injuries and occupational diseases. One of the key elements of such a system is the risk assessment process at workplaces, which allows identifying potential hazards and developing measures to eliminate or minimize them [13].

Traditional risk assessment methods based on paper documentation and manual calculations are often time-consuming and error-prone. The use of specialized software (software) allows you to automate this process, increase its accuracy and efficiency.

Risk assessment software provides an opportunity to systematize data on dangerous factors, conduct quantitative risk analysis, generate reports and recommendations for improving working conditions [14]. The development of such software requires taking into account the specifics of a specific industry, regulatory and legal requirements for labor protection, as well as providing a convenient and understandable interface for users. The following computer programs can be used to study the impact of risks on occupational safety: "RegAnalyz" [15] for univariate dependencies and "PlanExp" [16] for multivariable ones.

Correctly designed and implemented software for risk assessment becomes an important tool in the labor protection management system, contributing to the adoption of reasoned decisions and the implementation of preventive measures to ensure safe working conditions [17].

Research results

The process of risk assessment at the workplace is an integral part of the occupational health and safety management system at the enterprise. It involves the systematic identification of hazards, the analysis of the probability of their realization and the severity of the consequences, as well as the development of measures

to reduce risks to an acceptable level [17]. Traditionally, this process has been done manually, using paper forms and calculations, which can be time-consuming, error-prone and inefficient. The development of specialized software for the automation of risk assessment allows to significantly improve this process. The software provides an opportunity to systematize and store data on identified hazards, carry out quantitative risk analysis with the help of mathematical models and algorithms [18-22], generate reports and recommendations on the necessary labor protection measures [23].

Functional capabilities of software for risk assessment

Workplace risk assessment software should automate key steps in this process and provide users with the necessary tools to perform their functions effectively. The main functionality of such software may include maintaining a database of workplaces, equipment, technological processes and related dangerous factors [24]. This allows systematization and storage of information necessary for the identification and assessment of risks [25-30]. The software should also ensure the identification of hazards using various methods, such as checklists, analysis of regulatory requirements, workplace certification results, etc. To facilitate this process, the Software may provide users with ready-made templates and tools.

An important function of software for risk assessment is the direct assessment of risks using various methods, for example, the matrix method, the Fine-Kinney method, probabilistic analysis, etc. At the same time, the software should provide flexibility in the choice of assessment methods and the ability to adjust them to the needs of a specific organization. For a visual representation of the assessment results in the form of matrices, diagrams, schemes, etc., the software should provide the formation of risk maps. This facilitates the interpretation and analysis of the received data, and also contributes to a better understanding of the situation on the part of management and employees.

Based on the results of the risk assessment, the software should provide an opportunity to develop recommendations on measures to eliminate or minimize risks. To do this, the software can provide prompts for typical actions depending on the level of risk, as well as allow users to add their own recommendations based on the specifics of a particular workplace or production process. An important function of software is also the formation of reporting documentation, including plans for occupational health and safety measures, reports on the results of risk assessment, risk maps, etc.. Automation of this process saves time and improves the quality of documentation, as well as ensures its compliance with established requirements.

To ensure the effectiveness and timeliness of the implementation of planned actions to minimize risks, the software should provide the ability to monitor the implementation of planned actions and update the risk assessment. In particular, the software should allow monitoring the status of activities, appoint responsible persons, set deadlines and inform about the progress of implementation.

In addition, software for risk assessment may include additional functions, such as integration with other occupational health and safety management systems (for example, systems of training, accounting for protective equipment, medical examinations, etc.), data exchange between different departments and specialists, generation of statistical reports and analytical data , support for mobile access to carry out risk assessment directly at workplaces.

Thus, the functionality of software for risk assessment covers a wide range of tasks and allows you to comprehensively automate and support the risk management process at the workplace, which in turn contributes to increasing the level of occupational safety and reducing the likelihood of accidents and occupational diseases.

Advantages of using risk assessment software

The use of specialized software for risk assessment in the workplace has a number of significant advantages compared to traditional methods based on paper document flow and manual calculations. First of all, the use of software allows automating most routine operations, such as collecting and inputting initial data, performing calculations according to established algorithms, generating reports and documentation, etc. This makes it possible to significantly reduce time and labor costs for these processes, freeing up occupational health and safety specialists to solve more complex and creative tasks. In addition, the use of software improves the quality and reliability of risk assessment results, as it reduces the influence of the human factor and the probability of errors associated with inattention, insufficient competence of performers, subjectivity of assessments, etc. The software provides the possibility of using proven and validated methods of risk assessment, taking into account the established regulatory requirements and risk acceptability criteria, which increases the objectivity and comparability of the obtained results.

An important advantage of using software is the ability to accumulate and systematize data on identified hazards, assessed risks and measures taken to minimize them. The formation of a single database allows monitoring the dynamics of changes in the level of risks over time, evaluating the effectiveness of implemented measures, identifying problem areas and determining priorities for further improvement. Also, storing information in electronic form significantly facilitates its search, processing, transfer between departments and specialists, formation of analytical reports and statistical data. The use of software for risk assessment also contributes to increasing the level of involvement and awareness of workers regarding occupational safety issues.

The possibility of personnel participation in the process of hazard identification directly at workplaces, access to information about risks and measures to minimize them, visual presentation of assessment results in the form of risk maps, etc. – all this increases employees' awareness of the importance of compliance with safety requirements and forms an active position regarding participation in management risks. Another aspect is increasing the efficiency of planning and implementation of occupational safety precautions based on the results of risk assessment. Thanks to the automated collection and analysis of data, the use of risk ranking and categorization methods, the software allows you to determine priority areas for intervention, rationally allocate resources, monitor the progress of the plans and evaluate the effectiveness of the measures taken.

It is worth noting the role of software for risk assessment in reducing the organization's financial costs associated with accidents, occupational diseases and fines for violating labor protection requirements [31]. Thanks to the timely detection and elimination of unacceptable risks, the improvement of the quality of preventive measures, the formation of a safety culture in the organization, the use of such software allows minimizing the probability of incidents and mitigating their possible consequences, which ultimately leads to significant cost savings.

Of course, the implementation of risk assessment software is associated with certain costs for its development or acquisition, personnel training, modernization of the company's IT infrastructure, etc. However, as evidenced by the experience of organizations that successfully use such systems, these costs are quickly repaid by increasing the effectiveness of the risk assessment process, reducing the time and resources spent on routine operations, improving the quality of preventive measures and, as a result, reducing the level of industrial injuries and related costs.

In addition to direct economic effects, the use of software for risk assessment has a number of indirect benefits, such as increasing the image of the organization as a socially responsible employer, improving the social and psychological climate in the team, reducing staff turnover and increasing the attractiveness of the enterprise for potential employees.

After all, ensuring safe and healthy working conditions is not only a legally established obligation, but also an important factor in increasing the motivation and loyalty of personnel. Thus, the benefits of using software for risk assessment in the workplace are numerous and diverse, covering both technical and organizational, economic and social aspects. Implementation of such systems makes it possible to increase the overall efficiency of labor protection management, to ensure a comprehensive and proactive approach to the prevention of industrial injuries and occupational diseases, to form a sustainable safety culture in the organization.

Conclusions

The development and implementation of software for risk assessment at the workplace is a promising direction for improving the occupational health and safety management system. This software allows you to automate and increase the efficiency of the process of identifying hazards, quantifying risks and making recommendations for their reduction. Functional capabilities of software for risk assessment cover a wide range of tasks, including maintaining a database, identifying hazards, assessing risks using various methods, creating risk maps, developing recommendations, creating report documentation, monitoring the implementation of measures, etc.

For the successful implementation of such software, it is necessary to take into account a number of requirements, in particular, the specifics of the industry, compliance with regulatory and legal requirements, user-friendliness of the interface, technical characteristics, etc. The development process should be based on an analysis of the organization's needs and the involvement of key stakeholders. The introduction of software for risk assessment has significant advantages, such as automation of operations, improvement of the quality of results, the possibility of accumulating data, increasing the involvement of employees, reducing financial costs, etc.

In addition, the use of such software has a number of indirect positive effects for the organization. Thus, the development and implementation of software for risk assessment is an important addition to the occupational health and safety management system, which allows to increase the effectiveness of the prevention of industrial injuries and occupational diseases, to ensure a proactive approach to risk management and to form a safety culture in the organization.

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