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Widespread process automation enables companies to move to a new level of safety management.

Safety at production sites is a priority for any enterprise. In recent years, it is also one of the key indicators of business success along with performance, cost, and competitiveness of the company. Insufficient control over safety poses a serious risk to enterprise performance: in addition to the direct economic loss because of failures and accidents, it has an impact on the social image of the company as well. Consider these global statistics: accidents and occupational diseases cause \$ 3 trillion dollars loss to the global economy annually, which is 10-15% of global GDP.

Conscious necessity

A modern approach to business development makes it a priority to care about people, their lives and health. Labour safety excellence, zero injuries and accidents directly affect the performance, revenues and expenses of the enterprise. By investing resources in the development of the production safety system, it is possible not only to maintain production rates at a viable level, but significantly improve profitability of the company as well. Production supervisor's priority is fulfillment of the production plan while ensuring a high level of safety for employees.

This strategy, which has become virtually an axiom for any modern enterprise, promises to be even more advantageous in the near future. Over the last 10 years, the global industry has achieved significant results in reducing injuries at production sites. Industry statistics confirm significant decline in injury rates. So, according to the World Steel Association, Lost Time Injury Frequency Rate (LTIFR) decreased from 4.55 to 1.01, that is 78%, from 2006 to 2016. Analysts and consultants agree that systematic work on the implementation of occupational safety processes, and a structured approach to changes and training of employees helps reduce injuries, accidents and near-accidents at industrial enterprises by a mean of 66% over two to three years.

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It is important to realize that along with technological progress and development of the industrial sector in particular, modern approaches to labour protection and industrial safety management have also evolved. One of the most common methods of safety management – control by the management and control of actions of workers — is disappearing. Until recently, it was the only available tool to identify problems, search for the guilty and deal with critical situations. The popularity of this method is due to a large number of routine operations and manual labor in industries, for example, in the field of maintenance and control mechanism for extraction of minerals, etc. These days, due to significant changes in the field of automation of processes, companies move to a new level of safety management. Many have been able to move from purely regulatory measures to a conscious attitude of the workers to their own safety and soundness of assets.

Digital technology for protection

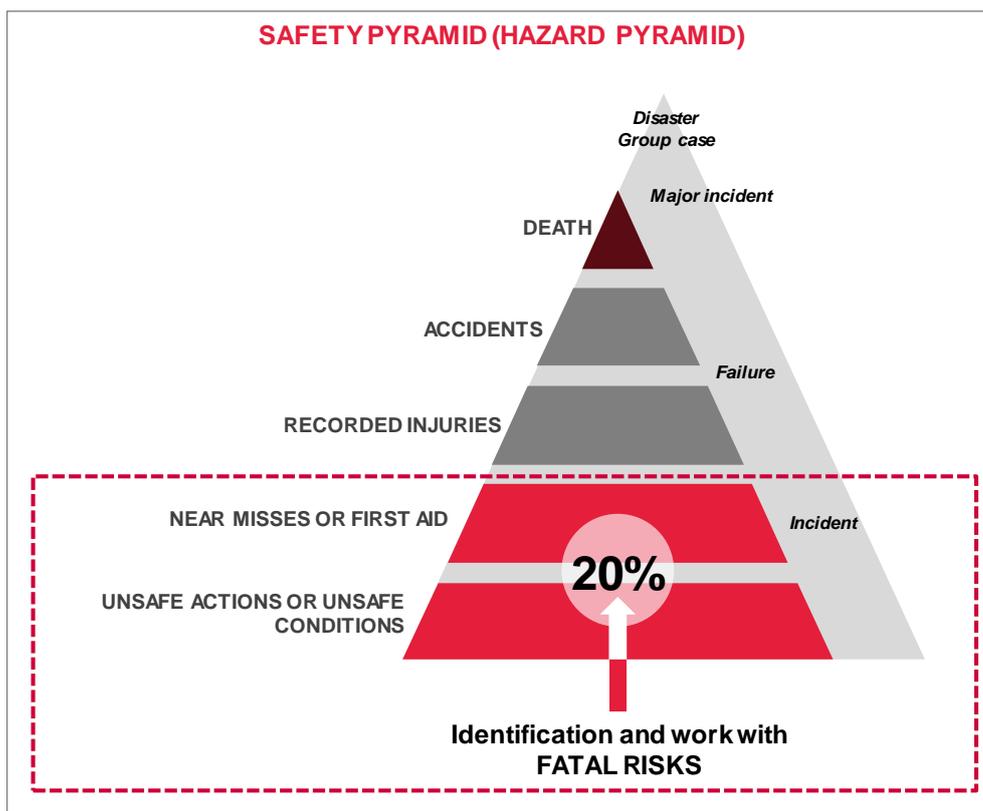
Modern technologies provide a means of significant increase in the level of protection of industrial personnel against accidents. Improvement of technological processes and an innovative approach to environmental and industrial safety is aimed at protecting the environment and achieving high environmental performance. The main tools for improving safety in the workplace — personal protective equipment (PPE) and various protective mechanisms — became the objects of digitization. Many companies offer digital solutions for PPE: for example, touch sensors, applications for face recognition, allowing to monitor the state of the worker, to identify unusual situations in the workplace, and to transmit a warning signal to the control panel, and other high-tech products.

Lean production, organization of order in the workplace (5S), various visualization tools and approaches to the standardization of production and maintenance activities have indirect impact on reducing injuries and accident frequency. These tools help detect and prevent losses in the production cycle, improve product quality, along with the efficiency of the whole enterprise. They are also affected by the latest digital technology, used to collect, process, optimize and transmit information to the various systems of the organization. In other words, a lot of things were done to reduce the risks of injury to employees at the modern enterprise.

Fatal risks — the modern approach

But given advancing high-tech solutions, the "zero injury" goal is often only a slogan, but not a real object for many organizations. Statistics show that if one were to select severe injuries and fatalities from the total volume of this data, then the injury rate decrease over the past 10 years is not so significant. Moreover, for some periods the fatalities rate even increased. For example, according to the International Council on mining and metals (ICMM), total number of fatalities in 2015-2016 increased at a time when there was a general decline in the number of registered incidents in the same period. The fact is that to reduce the serious and fatal injuries rate, different approaches are required based on identifying and addressing specific risks.

Modern studies confirm that only 20% of unsafe actions and unsafe conditions have the potential to be realized as severe or fatal injuries (see fig. 1).



Also, industrial safety research statistics show that the factors contributing to the development of less traumatic incidents and fatal or serious cases are different. This means that for efficient operations, it is necessary to be able to identify these fatal risks, focusing on factors that can potentially cause severe and fatal injuries. There are prerequisites for fatal risks in most organizations and can be identified and measured if necessary.

When working with fatal risk, the situation is complicated by the fact that these risks are not static — they are influenced by the conditions, experience of the employee, limited time, rush and other factors (see Fig. 2). What is the fatal risk at production sites? It is any risk that when performing production, maintenance and other operations can lead to irreversible consequences and affect the health and life of the employee. It is important to have a database on incidents, risk registers, reports on incident investigations in order to work with the risk categorization. This area is a field to implement digital solutions. Modern programs to recognize dangerous situations, use of neural networks and machine learning for continuous improvement of mechanism, identify and eliminate risks are successfully used by many companies.

**Main barriers
in identifying
fatal risks**

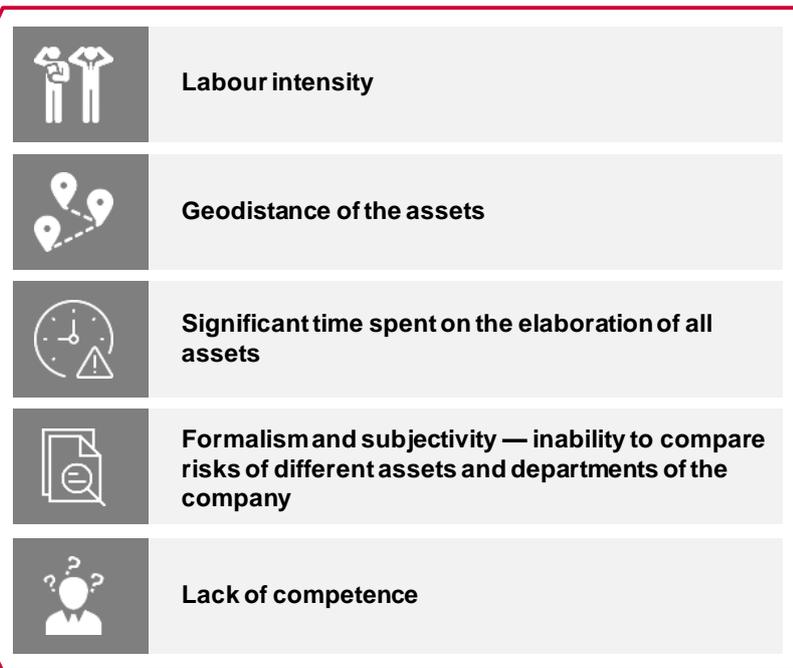


Fig. 2

Work to identify fatal risks makes special demands to people as well as certain skills and competencies. In this case, it is important to be able to prioritize and ensure proper distribution of actions on a shift basis: it is necessary that the area or shift leader has a clear understanding of what risks there are today in the context of specific jobs, operations and personnel.

In addition, it requires the preparatory work, which results in hundreds of fatal risks, identified by production staff together with HSE service. Usually this stage takes more than 6 months for medium size enterprises. However, modern techniques, use of digital technologies and experience of external experts may shorten the process to two to three months.

So, the basic steps to develop an effective system of identifying and eliminating of fatal risks are:

1. Put potentially dangerous operations, leading to severe and fatal injuries, into a separate category. Analysis of prerequisites and conditions leading to the implementation of fatal risks at the shop personnel level.
2. Development of competencies of HSE specialists in the use of modern methods to identify and analyse fatal risks. The use of digital technologies to collect, process and analyze data.
3. Constant shift work to identify fatal risks at the production site and focus on measures to prevent them by area leaders and foremen.