

Construction is one of the most dangerous industries in most countries of the world. This statement is confirmed by reports of various organizations and offices dealing with occupational safety research, as well as literature reports. The construction industry has the highest share of fatal accidents among all sectors of the economy. In Poland, in 2019, the probability of an accident at work in the construction industry was 0.53%. Taking into account the fact that a statistical Pole employed in the construction industry has been working in this sector of the economy for 34 years, it can be calculated that the probability that during his professional career he will be a victim of an accident at work is over 18%. This means that statistically every fifth person employed in the construction industry will have an accident at work during their professional career.

It should also be noted that accidents at work generate significant losses, both material and non-material. The costs of accidents at work are very difficult to estimate and their size is compared to a "drifting iceberg". Its visible part, located above the water surface, symbolizes the costs that can be estimated. A much larger and invisible part of this iceberg is below the water surface and symbolizes costs that are difficult to quantify. Among them are quality of life costs relating to the value of the pain and suffering experienced by victims and their families as a result of the event. Therefore, taking into account the above, it should be stated that accidents at work are a very negative phenomenon, not only due to the related material losses, but mainly due to immeasurable moral losses that are difficult to estimate. Therefore, all activities aimed at minimizing them should be taken.

Previous research by American scientists has shown that each accident that results in injury is preceded by the occurrence of many similar events that do not cause injury, the so-called near misses. According to a study by Heinrich, for every serious or fatal accident, there are 29 light accidents and 300 accidents without injuries. It should be clarified here that an accident at work is a sudden event caused by an external cause, causing an injury or death in connection with the work. On the other hand, a near miss is a sudden event occurring during work in which an employee could be injured or even die if the circumstances were slightly different. As the research cited above shows, the number of near misses is several times greater than the number of accidents.

Since the near misses precede the accident, scientific and research questions are beginning to emerge, namely: Is it possible to predict the occurrence of an accident at work on the basis of the knowledge obtained from near misses? What are the indications that an accident may occur? Is there a relationship between near misses and accidents at work and can it be described using formulas and mathematical algorithms? What are the main causes of near misses and are they the same as the causes of accidents? And many others.

Based on these questions and doubts, the goal of the project was formulated, which is a comprehensive and multifaceted analysis of near misses and accidents at work and the formulation of on its basis, the relationships between these events. The main result of the project will be formulas and mathematical algorithms describing with high accuracy the relationship between the two phenomena. The calculations made with the use of the developed models will be helpful in estimating the probability of an accident and the degree of its severity. Thus, they can be used to assess occupational risk. The independent variables appearing in the models will indicate the main occupational risk factors. The project will use mathematical statistics tools available in the Statistica software.

The project is very important for the development of knowledge about work safety in construction. First of all, acquiring knowledge on the basis of near misses that precede accidents and using it in practice is very beneficial because it generates much lower research costs.. The practical application of the test results will contribute to reducing the number of accidents, and thus reducing the material and non-material losses generated by accidents. The research will be conducted on a large collection of events covering over 1,500 cases, registered from 2015 to 2021. The analyzed events will concern various types of construction objects, construction works and the circumstances in which the event occurred. Such a large spectrum of information will allow for their classification and conducting research focused on specific aspects of construction, as well as in a comprehensive manner. The results of the conducted research and analyzes will facilitate the prediction of an accident at work on the basis of the most important circumstances and causes of potentially accidental events. It will be possible to estimate the probability of an accident and its consequences, and thus the occupational risk assessment. The variables selected from the set of near misses, which are independent variables of the models built, will be the main risk factors of an accident.