



Miesięcznik TNOiK
Założył Karol Adamiecki w 1926 r.

PREMISES AND EFFECTS OF USING THE RISK SCORE METHOD TO ASSESS OCCUPATIONAL RISK AT A SELECTED POSITION

<https://doi.org/10.33141/po.2018.06.03>

Organization Review, No. 6, 2018, Vol. 941, pp. 16-27
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Introduction

Safety management at workplace is an extremely important aspect in social, technical and medical areas. It is the basis for the functioning of each work environment. High costs related to work safety, which, according to employers, range from 0.5 to 1% are also significant. If, on the other hand, the costs incurred by the Social Insurance Institution are taken into account – from the accident fund, which arises from the contributions of all insured persons, they amount to approx. PLN 5 billion annually of direct costs, and indirect costs of about PLN 20 billion (Beściak, 2011).

The change to a „culture of prevention” via „systematic and comprehensive risk management” involves a journey (Hudson, 2003), but to shorten a long story it is enough to mention that over time, more than 60 Technical

Committees and Working Groups of ISO and national standards or regulatory bodies, have addressed the risk management issue. Numerous multi-sectoral standards have been drafted, e.g. OHSAS 18001, BS 8800, FD X50-252:2006, ISO/IEC 51 guide etc. or dedicated to a particular sector, while the AS/NZS 4360:2004 (published in 1995 and amended in 1999) was the most widely used global standard for risk management (Moraru, 2012). Considering the need for unification, after Australia’s proposition a Working Group on Risk Management was established and after long process in November 2009, the ISO 31000:2009 standard was issued (ISO, 2009).

Safety management at workplaces is determined by a number of factors, including environmental, psycho-social, legal, social insurance and personal risk factors

(Warchał, 2010; Geller 2005). Safety management is defined as actions aimed at achieving and maintaining safety. These actions are based on a threat being detected immediately, identified and minimized or completely removed. An important aspect of safety management is also control and monitoring of implemented improvements, which is reflected in safety improvement. Safety is associated with limiting or completely eliminating the risk that may result in loss of health or life (Kopczewski, Smal, 2017). A prerequisite for preventing unintended events is the knowledge of phenomena and processes that accompany them when they occur. Appropriate identification of hazards is the starting point for the preparation of sound operational strategies, legal solutions, creation of units responsible for operational and preventive actions. The rank and scale of the threat are important in this process, due to the appropriate selection of methods and tools to take action in the field of threats (Raczkowski, Sułkowski, 2014).

Occupational risk analysis is a process used to analyse the work process (Ingram, 2013). This process involves detecting and identifying hazards, analysing them and introducing measures and safeguards that improve working conditions and protect employees against harmful agents (Kopczewski, Smal, 2017). These actions lead to increased efficiency of employees' work and improved standards of working conditions. Introducing changes in terms of improving working conditions has a significant impact not only on a company itself but also on the whole country. Reducing accidents and occupational diseases is also associated with lower social costs (Smoliński, 2001).

According to the Labour Code, an employer is obliged to assess occupational risk at job positions of the establishment and inform employees of the level of risk before they commence work. Moreover, an employer is obliged to introduce measures to minimize the level of risk involved. These obligations also stem from the European Union directives that require employers to carry out occupational risk assessments (Dyrektywa ..., 1989). Furthermore, employers are required to document accidents, occupational risk and post-accident investigation. There is also an appropriate body designated for analysing the correctness of fulfilling the abovementioned obligations by employers (Ustawa ..., 1974). Acting as a body that controls working conditions as well as assesses and analyses risk, the National Labour Inspectorate oversees the reliability and compliance of the documentation maintained by employers (National Labour Inspectorate, 2017).

It is worth mentioning that there are many action-oriented research that can contribute to a more effective risk control in different settings. The most relevant criteria are: adaptive risk management; work/risk relationships; action-oriented risk assessment; use of collective expertise; participation of local people; mutual learning. However, according to (Kogi, 2002) it appears crucial to stimulate research into the practical risk control procedures adjusted to the local situation. As pointed out as well as by (Joy, Griffiths, 2004) the key for success is for companies „to select the method that is designed to suit their needs”.

Taking above into consideration, the main aim of the article is to present the occupational risk analysis methodology due to assess occupational risk at selected positions by adjusting to local conditions the well-known and popular Risk Score Method. The research was conducted in the years 2013–2016 on the basis of statistic data analysis and personal observation in the Military Academy of Land Forces (Gaik, Smal, 2017). Due to limited space, only one position is presented as an example in the paper. It should be noted that the article contains only a selected part of broader studies and presents a case study that confirmed the assumption that it is not necessary to apply sophisticated methods for risk assessment, because well-known and simple methods are effective as well.

Methodological assumptions for the risk management procedure

Occupational risk prevention and control requires the implementation of a health and safety management system that allows organisations to carry out safety practices in a way that is structured, coordinated, and integrated into their whole set of activities and decisions. Being aware of this need, organizations have begun to demand a management model that has a demonstrable implementation, and consequently in many cases the international standard, which offers the possibility of certification, is gaining increasing acceptance (Muñiz i in., 2012). It is always important to bear in mind that the primary purpose of this process is to determine whether risk is adequately controlled and whether it can be considered acceptable. In addition, it is important to consider what measures should be taken to reduce identified risk identified. As a result of occupational risk assessment, it is also necessary to establish what measures can be taken to improve safety and health of employees (Polska Norma, 2011).

Such assumptions enable to systematize the procedure of carrying out occupational risk analysis at selected workplaces, through (Romanowska-Słomka, Słomka, 2006): taking into account all the work performed at the position under assessment, identifying all hazards associated with each work performed at this workplace, estimation of risk prevailing for each work, identifying and undertaking necessary preventive measures.

The occupational risk analysis can be treated as a multi-stage process and carried out „step by step” (Fig. 1). Following this assessment, corrective and preventive actions should be taken, if it proves necessary (Raczkowski, 2016).

Despite the flexibility in choosing a method for occupational risk assessment, there must be some logical continuity and sequence of actions performed during its conduct. In the available literature, researchers provide various methods that can be applied in occupational risk assessment, starting with the simple one – Risk Score Method, to complex approaches like a proactive approach to the management of occupational risks – Proactive Risk Management (Murashov, Howard, 2009). Acquiring the experience, the risk assessor learns which assessment tool is best for investigating a certain type of activity.

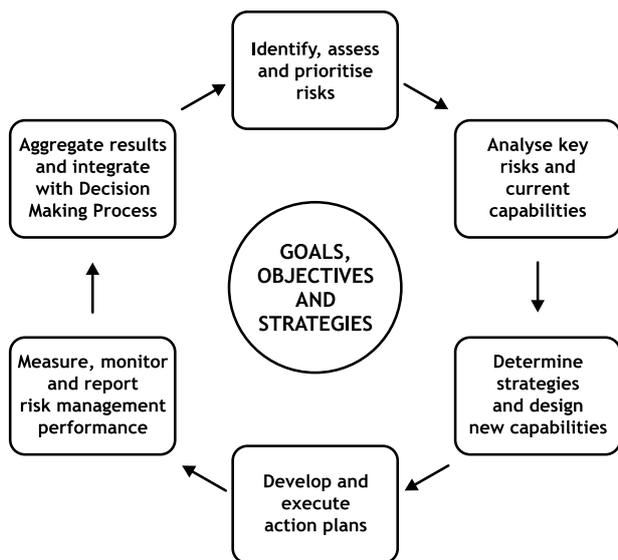


Figure 1. Risk Management Process - Marsh Perspective
Source: own elaboration based on (Moraru, 2012)

The limited size of the article does not make it possible to analyse all well-known methods. Regardless of the selected method, carrying out occupational risk assessment implies the need to determine how the measurements are to be taken. The evaluation therefore determines finding appropriate states and reference patterns that will be available when conducting measurements and arranging them in a way to create a sort of own measurement scale. This can be done, for example, on the basis of three planes (Romanowska – Słomka, Słomka, 2006):

1. The likelihood of fatalities or other unfortunate consequences (e.g. cancer).
2. Costs of the expected consequences of a hazard.
3. The probability of consequences occurrence may vary in the range of 0–100%.

For the purpose of the presented case study, the well-known and described in many publications Risk Score Method was used. The conducted approach fully reflected the actual state of hazards at workplaces under evaluation.

While performing risk assessment, the following steps were taken:

1. Stage I: Description of the analysed job position. At this stage, source materials were analysed and the workplace was observed. The materials collected helped to develop a job description form. The information used in the form comes from the following sources:
 - a staff member’s personal file, including the scope of duties and responsibilities in the position;
 - observation of work process and activities performed by an employee on a given job position;
 - technical documentation of machines and equipment;
 - analysis of documentation held in the OSH (Occupational Safety and Health) section, including the register of occupational accidents and diseases, annual analyses of OSH conditions, reports on working conditions for statistical purposes (CSO, Z-10 form), information obtained from OSH specialists;

Table 1. List of risks to health and life most often occurring at workplaces

No.	Risk
1	Fall on the same level (slip, stumble, etc.)
2	Fall to the lower level (fall from a height)
3	Fall into cavities and ducts
4	Impact, crushing by material agents transported mechanically or manually
5	Contact with sharp moving hand tools
6	Impact, catching or crushing by machines, their parts, devices, tools or means of transport
7	Impact, crushing by falling, spilling or pouring material (loosened machine parts, tools, materials, stones, rock fragments, etc.)
8	Contact with sharp stationary material agents
9	Human body impact on immobile material agents
10	Cutting from sharp, protruding elements (blades, sharp edges, rough surfaces)
11	Contact with hot or cold surfaces
12	Contact with dangerous and harmful chemicals (corrosive, burning, etc.)
13	Another kind of contact with material agents
14	Fire, explosion
15	Electric shock with a voltage of less than 1 kV
16	Electric shock with a voltage of more than 1 kV
17	Events related to static electricity
18	Noise
19	Mechanical vibration
20	Electromagnetic radiation
21	Ionizing radiation
22	Electric or magnetic field
23	Toxic chemical agents
24	Chemical irritants
25	Electromagnetic radiation
26	Electromagnetic radiation
27	Ionizing radiation
28	Electric or magnetic field
29	Toxic chemical agents
30	Chemical irritants
31	Microorganisms and macro-organisms and their products
32	Repulsive, unpleasant or additionally burdening (such as pungent odours) of impurities, forced contact with water, working under challenging weather conditions (especially during precipitation), etc.
33	Failures and other malfunctions of a material agent
34	Natural forces (lightning, flood, etc.)
35	Sudden medical cases (e.g. infarction, stroke)
36	Other events
37	Dynamic physical load

Source: (Świeboda, 2014)

Table 2. Job Description

JOB DESCRIPTION – for occupational risk assessment	
1. JOB TITLE	2. DIVISION / DEPARTMENT
Car mechanic	Technical section
3. WORK SYSTEM (daily, shift, number of shifts)	4. NUMBER OF EMPLOYEES
Daily	Total: 2 incl.: women – --
5. QUALIFICATIONS REQUIRED (basic)	6. QUALIFICATIONS REQUIRED (additional, licenses)
Vocational education – car mechanic	License to carry out vehicle diagnostic tests
7. LOCATION OF WORK POSITION / SITE BOUNDARY	
Workplace: the maintenance hall (repair and service) of motor vehicles; Site boundary: the area and communication routes	
8. JOB DESCRIPTION / type of work performed	
A car mechanic is a physical workstation. A mechanic performs servicing and repairing of vehicles, especially in the maintenance hall at the institution. A mechanic may also work on a vehicle outside the maintenance hall. A mechanic performs work in repair channels or with the use of cranes and lifts. Often in a forced position of the body (lying, bent, kneeling or standing). The maintenance hall where a mechanic works is heated but has very loose garage gates. Lighting in the hall is uneven.	
9. BASIC DUTIES	
<ul style="list-style-type: none"> • failure diagnostics of mechanical and driving systems in vehicles, • repair of motor vehicles at the institution – according to the submitted request, • periodic technical inspections of vehicles, • replacement of damaged parts, • exchange of materials and consumables (oils, filters, fluids, etc.). 	
10. MATERIALS AND TECHNICAL MEASURES USED	
Diagnostic devices, measuring instruments and equipment, manual or pneumatically and electrically operated tools, cranes, vehicle jacks, winches, wheel balancers, oils and greases, chassis maintenance agents, agents for minor repair and lacquer works	
11. HARMFUL HAZARDOUS OR BURDENSOME FACTORS ON WORK POSITION	
<ul style="list-style-type: none"> • corrosive substances, allergens, irritants, fuel fumes, lubricants, oils, kerosene, operating fluids, etc., • vehicle exhaust fumes and cut (sanded) surfaces, • sharp and hot particles and fragments produced by grinding or cutting metals, • work in channels or under lifts, • uneven or slippery surfaces, • forced body position, including work in repair channels, • rotating tool parts, electrically or pneumatically driven tools, • sharp edges, rotating parts of a vehicle, vehicle in motion, • flammable, fire hazard forming substances, • eye strain – work in poor lighting conditions, • variable atmospheric conditions. 	
12. ENVIRONMENTAL TESTS AND MEASUREMENTS RESULTS	
Noise: 93, 5 dB for 8 hour exposure; Lighting: depending on the place of measurement in the maintenance hall, the values did not meet the standard.	
13. SAFEGUARDS - COLLECTIVE AND INDIVIDUAL PROTECTION	
<ul style="list-style-type: none"> • gravity ventilation system, mechanical ventilation system, • oil resistant gloves, • oil resistant apron, • hearing protectors, • eye protection, • protective helmet, • prophylactic medical examination 	
14. HEALTH REQUIREMENTS (basic)	15. HEALTH REQUIREMENTS (specific)
Possessing up-to-date medical certificate on the absence of contraindications to perform work at the job position	None
16. OCCUPATIONAL ACCIDENTS/ CONFIRMED OCCUPATIONAL DISEASES	
Not found	

Source: own elaboration



Table 3. Identification of hazards, their sources, possible effects and applied safety measures

IDENTIFICATION OF HAZARDS, THEIR SOURCES, POSSIBLE EFFECTS AND APPLIED SAFETY MEASURES				
No.	HAZARDS	SOURCES OF HAZARDS	POSSIBLE EFFECTS OF HAZARDS	SAFETY MEASURES APPLIED
1	Fall on the same level (slip, stumble)	Slippery surface of the floor of the maintenance hall and communication routes, spilled oil or operating fluids, stumbling or tripping on fixed parts of the hall or elements or parts (wires) left behind	Injuries to body parts, in particular lower limbs injuries, sprains, dislocations, fractures, head injury	Caution when moving, maintaining order at a work stand, appropriate occupational and safety footwear
2	Fall from the higher to the lower level (fall from a height)	Slipping or tripping on fixed elements of the maintenance hall or elements or parts (wires) left behind; fall from interior stairs (going down to a channel) and outside stairs, fall into an unprotected channel, fall from a vehicle being serviced	Severe injuries, head spine and lower and upper limbs injuries	Particular care taken during work, maintaining order at a work stand, securing an unoccupied repair channel, care when moving around the hall
3	Hitting a stationary object	Hitting permanent workshop equipment and used machinery and equipment with a part of the body, hitting fixed or repaired vehicles in areas difficult to reach, e.g. in pits	Head injuries, injuries to body parts, bruises	Caution during repair works, head protection used, proper organization of work and order in the place of performing tasks
4	Impact from moving parts of machines or devices	Being hit by moving devices or tools, including pneumatic, hitting by rotating parts of equipment and tools	Head and facial injuries, body parts injuries, wounds	Particular caution when using equipment and electric tools with rotating components, face and head protection used, compliance with safety instructions and operating manuals for machines, devices and tools
5	Hitting, crushing by vehicles or transported parts	Hitting/crushing by moving vehicles or other means of transportation, crushing by refurbished vehicles – standing on a lift or other supports, fall or impact of a transported part of a vehicle or a vehicle component	Death, head injuries, body parts injuries, mainly fractures	Particular care during service and repair works using lifts and supports, compliance with safety instructions, handling a crane only by authorized persons and in accordance with operating instructions, caution when entering or exiting a vehicle from the hall, assurance when vehicles are in motion in the hall
6	Impact from falling objects	Assembled and disassembled vehicle components, tools	Injuries to the head, lower and upper limbs	Special care during service and repair works, using personal protection – head protection (helmet), compliance with safety instructions
7	Impact from moving parts of machines or devices	Being hit by moving devices or tools, including pneumatic, hitting by rotating parts of equipment and tools	Head and facial injuries, body parts injuries, wounds	Particular caution when using equipment and electric tools with rotating components, face and head protection used, compliance with safety instructions and operating manuals for machines, devices and tools
8	Hitting, crushing by vehicles or transported parts	Hitting/crushing by moving vehicles or other means of transportation, crushing by refurbished vehicles – standing on a lift or other supports, fall or impact of a transported part of a vehicle or a vehicle component	Death, head injuries, body parts injuries, mainly fractures	Particular care during service and repair works using lifts and supports, compliance with safety instructions, handling a crane only by authorized persons and in accordance with operating instructions, caution when entering or exiting a vehicle from the hall, assurance when vehicles are in motion in the hall
9	Impact from falling objects	Assembled and disassembled vehicle components, tools	Injuries to the head, lower and upper limbs	Special care during service and repair works, using personal protection – head protection (helmet), compliance with safety instructions
10	Contact with hot surfaces	Hot engine components, hot parts of electric tools	Thermal burns	Special care during service and repair works, using gloves, compliance with safety instructions
11	Sharp-edged surfaces, cutting edges	Tools, sharp parts of a vehicle, car body parts, etc.	Cutting injuries and cuts	Special care during service and repair works, using personal protection, including gloves, compliance with safety instructions
12	Body overload, muscle fatigue	Physical work, manual carrying objects	Muscle pain, tendon rupture, spinal injury	Using transport mechanical equipment, trolleys, carriages, etc., using lifting and handling equipment, manual handling instructions for manual transport, refreshments and meals

IDENTIFICATION OF HAZARDS, THEIR SOURCES, POSSIBLE EFFECTS AND APPLIED SAFETY MEASURES				
No.	HAZARDS	SOURCES OF HAZARDS	POSSIBLE EFFECTS OF HAZARDS	SAFETY MEASURES APPLIED
13	Noise	Operating engines of vehicles, machines and tools (electric and pneumatic) – especially when working simultaneously	Auditory organs diseases or hearing impairment, irritability and mental fatigue in case of noise nuisance	Personal protective equipment, proper organization of work – operating on a rotating basis, avoiding the work of machines and equipment at the same time
14	Variable microclimate	Work in maintenance hall at the open garage gate, periodically doing work in the open air	Respiratory system diseases: colds	Using clothing suitable for weather conditions, when possible – taking into account the current weather conditions during work organization
15	Chemically irritating substances and preparations	Oils, greases, operating liquids, cleaners for engines and parts (substances and preparations absorbed by the respiratory system, skin)	Irritation of respiratory tract, skin, etc.	Compliance with procedures for handling measures, instructions for safe handling of chemicals, using personal protective measures (masks, glasses, protective clothing), properly (effectively) functioning ventilation
16	Corrosive substances and preparations	Engine cleaners, skin contact	Chemical burns	Using personal protective equipment (masks, glasses, protective clothing, gloves), instructions for safe operation
17	Contact with electricity	Electrical installation in the maintenance hall; additional local lighting (portable lamps); electric powered devices; electric power tools	Electric shock, severe injuries to the body including fatal accidents	Compliance with manuals for operating equipment and tools; compliance with the prohibition on repairs of installations and equipment – failure reporting; increased attention; periodic equipment inspection
18	Forced position of the body	Working in confined spaces, difficult access, working in a repair channel, under vehicles or at vehicles	Muscle pains, spinal pain	Using instruments to facilitate work, proper organization of work, variability of work
19	Dust in the eye	Carelessness and haste, metal filings, performing service and repair works under the vehicles	Eye injuries	Personal protective equipment – cap, protective goggles
20	Fire and explosion	Sparking fire; careless handling with flammable and explosive materials; non-adherence to the smoking ban; defective electric installation	Burns, poisoning by carbon monoxide and chemical compounds contained in the smoke, death	Strict adherence to applicable fire prevention instructions; instructions for handling with flammable materials; smoking in designated areas

Source: own elaboration

Table 4. Occupational Risk Assessment Sheet

OCCUPATIONAL RISK ASSESSMENT SHEET according to RISK SCORE method						
No.	TYPE OF HAZARD/ NUISANCE	POSSIBLE EFFECTS OF HAZARD (S)	EXPOSURE TO HAZARD (E)	PROBABILITY OF HAZARD OCCURRENCE (P)	RISK CATEGORY (R) R = S x E x P	PROTECTIVE MEASURES
1	Fall on the same level (slip, stumble)	S=3 absence	E=6 frequent (every day)	P=3 practically possible	R=54 Low	Control needed, care must be taken to ensure that the risk remains at the same level
2	Fall from the higher to the lower level (fall from a height)	S=7 severe injuries	E=6 frequent (every day)	P=1 unlikely, but possible	R=42 Low	Control needed, care must be taken to ensure that the risk remains at the same level
3	Hitting a stationary object	S=3 absence	E=6 frequent (every day)	P=3 practically possible	R=54 Low	Control needed, care must be taken to ensure that the risk remains at the same level
4	Impact from moving parts of machines or devices	S=3 absence	E=6 frequent (every day)	P=3 practically possible	R=54 Low	Control needed, care must be taken to ensure that the risk remains at the same level

OCCUPATIONAL RISK ASSESSMENT SHEET according to RISK SCORE method						
No.	TYPE OF HAZARD/ NUISANCE	POSSIBLE EFFECTS OF HAZARD (S)	EXPOSURE TO HAZARD (E)	PROBABILITY OF HAZARD OCCURRENCE (P)	RISK CATEGORY (R) R = S x E x P	PROTECTIVE MEASURES
5	Hitting, crushing by vehicles or transported parts	S=7 severe injuries	E=3 occasionally (once a week)	P=3 practically possible	R=63 Low	Control needed, care must be taken to ensure that the risk remains at the same level
6	Impact from falling objects	S=3 absence	E=6 frequent (every day)	P=3 practically possible	R=54 Low	Control needed, care must be taken to ensure that the risk remains at the same level
7	Contact with hot surfaces	S=3 absence	E=1 minimal (several times a year)	P=3 practically possible	R=9 Acceptable	No need to take action but control is recommended to ensure that the risk remains at the same level
8	Sharp-edged surfaces, cutting edges	S=3 absence	E=6 frequent (every day)	P=3 practically possible	R=54 Low	Control needed, care must be taken to ensure that the risk remains at the same level
9	Body overload, muscle fatigue	S=3 absence	E=6 frequent (every day)	P=3 practically possible	R=54 Low	Control needed, care must be taken to ensure that the risk remains at the same level
10	Noise	S=3 absence	E=6 frequent (every day)	P=3 practically possible	R=54 Low	Control needed, care must be taken to ensure that the risk remains at the same level
11	Variable microclimate	S=3 absence	E=1 minimal (several times a year)	P=3 practically possible	R=9 Acceptable	No need to take action but control is recommended to ensure that the risk remains at the same level
12	Chemically irritating substances and preparations	S=3 absence	E=3 occasionally (once a week)	P=3 practically possible	R=27 Low	Control needed, care must be taken to ensure that the risk remains at the same level
13	Corrosive substances and preparations	S=3 absence	E=3 occasionally (once a week)	P=3 practically possible	R=27 Low	Control needed, care must be taken to ensure that the risk remains at the same level
14	Contact with electricity	S=7 severe injuries	E=3 occasionally (once a week)	P=3 practically possible	R=63 Low	Control needed, care must be taken to ensure that the risk remains at the same level
15	Forced position of the body	S=3 absence	E=6 frequent (every day)	P=3 practically possible	R=54 Low	Control needed, care must be taken to ensure that the risk remains at the same level
16	Dust in the eye	S=1 first-aid assistance	E=6 frequent (every day)	P=3 practically possible	R=18 Acceptable	No need to take action but control is recommended to ensure that the risk remains at the same level
17	Fire and explosion	S=7 severe injuries	E=3 occasionally (once a week)	P=3 practically possible	R=63 Low	Control needed, care must be taken to ensure that the risk remains at the same level
GENERAL OCCUPATIONAL RISK ASSESSMENT AT THE EVALUATED WORKPLACE:						
RISK:		Acceptable			No need to take preventive actions	
REMARKS		LACK OF OR NON-USE OF PREVIOUS PROTECTIVE MEASURES INCREASES THE RISK CATEGORY, I.E. ENHANCES THE PROBABILITY OF ACCIDENT/ DISEASE OCCURRENCE				

Source: own elaboration

Table 5. Employee's Occupational Risk Information Sheet

EMPLOYEE'S OCCUPATIONAL RISK INFORMATION SHEET				
No.	HAZARDS	SOURCES OF HAZARDS	POSSIBLE EFFECTS OF HAZARD	OCCUPATIONAL RISK CATEGORY
1	Fall on the same level (slip, stumble)	Slippery surface of the floor of the maintenance hall and communication routes, spilled oil or operating fluids, stumbling or tripping on fixed parts of the hall or elements or parts (wires) left behind	Injuries to body parts, in particular lower limbs injuries, sprains, dislocations, fractures, head injury	ACCEPTABLE RISK
	PROTECTIVE MEASURES AGAINST HAZARD REQUIRED	Caution when moving, maintaining order at a work stand, appropriate occupational and safety footwear		
2	Fall from the higher to the lower level (fall from a height)	Slipping or tripping on fixed elements of the maintenance hall or elements or parts (wires) left behind; fall from interior stairs (going down to a channel) and outside stairs, fall into an unprotected channel, fall from a vehicle being serviced	Severe injuries, head spine and lower and upper limbs injuries	ACCEPTABLE RISK
	PROTECTIVE MEASURES AGAINST HAZARD REQUIRED	Particular care taken during work, maintaining order at a work stand, securing an unoccupied repair channel, care when moving around the hall		
3	Hitting a stationary object	Hitting permanent workshop equipment and used machinery and equipment with a part of the body, hitting fixed or repaired vehicles in areas difficult to reach, e.g. in pits	Head injuries, injuries to body parts, bruises	ACCEPTABLE RISK
	PROTECTIVE MEASURES AGAINST HAZARD REQUIRED	Caution during repair works, head protection used, proper organization of work and order in the place of performing tasks		
4	Impact from moving parts of machines or devices	Being hit by moving devices or tools, including pneumatic, hitting by rotating parts of equipment and tools	Head and facial injuries, body parts injuries, wounds	ACCEPTABLE RISK
	PROTECTIVE MEASURES AGAINST HAZARD REQUIRED	Particular caution when using equipment and electric tools with rotating components, face and head protection used, compliance with safety instructions and operating manuals for machines, devices and tools		
5	Hitting, crushing by vehicles or transported parts	Hitting/crushing by moving vehicles or other means of transportation, crushing by refurbished vehicles – standing on a lift or other supports, fall or impact of a transported part of a vehicle or a vehicle component	Death, head injuries, body parts injuries, mainly fractures	ACCEPTABLE RISK
	PROTECTIVE MEASURES AGAINST HAZARD REQUIRED	Particular care during service and repair works using lifts and supports, compliance with safety instructions, handling a crane only by authorized persons and in accordance with operating instructions, caution when entering or exiting a vehicle from the hall, assurance when vehicles are in motion in the hall		
6	Impact from falling objects	Assembled and disassembled vehicle components, tools	Injuries to the head, lower and upper limbs	ACCEPTABLE RISK
	PROTECTIVE MEASURES AGAINST HAZARD REQUIRED	Special care during service and repair works, using personal protection – head protection (helmet), compliance with safety instructions		
7	Contact with hot surfaces	Hot engine components, hot parts of electric tools	Thermal burns	ACCEPTABLE RISK
	PROTECTIVE MEASURES AGAINST HAZARD REQUIRED	Special care during service and repair works, using gloves, compliance with safety instructions		
8	Sharp-edged surfaces, cutting edges	Tools, sharp parts of a vehicle, car body parts, etc.	Cutting injuries and cuts	ACCEPTABLE RISK
	PROTECTIVE MEASURES AGAINST HAZARD REQUIRED	Special care during service and repair works, using personal protection, including gloves, compliance with safety instructions		

EMPLOYEE'S OCCUPATIONAL RISK INFORMATION SHEET				
No.	HAZARDS	SOURCES OF HAZARDS	POSSIBLE EFFECTS OF HAZARD	OCCUPATIONAL RISK CATEGORY
9	Body overload, muscle fatigue	Physical work, manual carrying objects	Muscle pain, tendon rupture, spinal injury	ACCEPTABLE RISK
	PROTECTIVE MEASURES AGAINST HAZARD REQUIRED	Using transport mechanical equipment, trolleys, carriages, etc., using lifting and handling equipment, manual handling instructions for manual transport, refreshments and meals		
10	Noise	Operating engines of vehicles, machines and tools (electric and pneumatic) – especially when working simultaneously	Auditory organs diseases or hearing impairment, irritability and mental fatigue in case of noise nuisance	ACCEPTABLE RISK
	PROTECTIVE MEASURES AGAINST HAZARD REQUIRED	Personal protective equipment, proper organization of work – operating on a rotating basis, avoiding the work of machines and equipment at the same time		
11	Variable microclimate	Work in maintenance hall at the open garage gate, periodically doing work in the open air	Respiratory system diseases: colds	ACCEPTABLE RISK
	PROTECTIVE MEASURES AGAINST HAZARD REQUIRED	Using clothing suitable for weather conditions, when possible – taking into account the current weather conditions during work organization		
12	Chemically irritating substances and preparations	Oils, greases, operating liquids, cleaners for engines and parts (substances and preparations absorbed by the respiratory system, skin)	Irritation of respiratory tract, skin, etc.	ACCEPTABLE RISK
	PROTECTIVE MEASURES AGAINST HAZARD REQUIRED	Compliance with procedures for handling measures, instructions for safe handling of chemicals, using personal protective measures (masks, glasses, protective clothing), properly (effectively) functioning ventilation		
13	Corrosive substances and preparations	Engine cleaners, skin contact	Chemical burns	ACCEPTABLE RISK
	PROTECTIVE MEASURES AGAINST HAZARD REQUIRED	Using personal protective equipment (masks, glasses, protective clothing, gloves), instructions for safe operation		
14	Contact with electricity	Electrical installation in the maintenance hall; additional local lighting (portable lamps); electric powered devices; electric power tools	Electric shock, severe injuries to the body including fatal accidents	ACCEPTABLE RISK
	PROTECTIVE MEASURES AGAINST HAZARD REQUIRED	Compliance with manuals for operating equipment and tools; compliance with the prohibition on repairs of installations and equipment – failure reporting; increased attention; periodic equipment inspection		
15	Forced position of the body	Working in confined spaces, difficult access, working in a repair channel, under vehicles or at vehicles	Muscle pains, spinal pain	ACCEPTABLE RISK
	PROTECTIVE MEASURES AGAINST HAZARD REQUIRED	Using instruments to facilitate work, proper organization of work, variability of work		
16	Dust in the eye	Carelessness and haste, metal filings, performing service and repair works under the vehicles	Eye injuries	ACCEPTABLE RISK
	PROTECTIVE MEASURES AGAINST HAZARD REQUIRED	Personal protective equipment – cap, protective goggles		
17	Fire and explosion	Sparking fire; careless handling with flammable and explosive materials; non-adherence to the smoking ban; defective electric installation	Burns, poisoning by carbon monoxide and chemical compounds contained in the smoke, death	ACCEPTABLE RISK
	PROTECTIVE MEASURES AGAINST HAZARD REQUIRED	Strict adherence to applicable fire prevention instructions; instructions for handling with flammable materials; smoking in designated areas		
Absence or non-use of security measures increases the risk category, i.e. enhances the probability of an accident or disease occurrence				

Source: own elaboration

- research results and measurement of harmful factors conducted by the Labour Environment Research Laboratory;
- during an interview with an employee working in the position under examination.

The information collected in the form served to carry out further risk assessment procedure.

2. Stage II: Hazard Identification. Hazards were identified by analysing the information collected in the first stage. The Job Safety Analysis method consisting in the description of all tasks performed at workplaces was used to identify hazards and determine risks, situations and dangerous events associated with them. The analysis of OSH conditions was helpful to identify hazards at the selected job positions (Smoliński, 2001). For this purpose, a checklist containing the list of occupational risks to health and life is presented in Table 1. The identified hazards were included in the purposefully set up card for identifying risks, their sources, possible effects and safeguards used.
3. Stages III and IV: Estimating risk and setting risk acceptability. The risk estimation stage is closely linked to the stage of identifying hazards. It depends on the subjugation of certain values to each hazard depending on the degree of damage and its probability.
4. Stage V: Summary of the occupational risk assessment. The acceptability stage completes proper occupational risk assessment. However, taking into account the methodology of operation, the wholeness of the activities performed should be summarized. Therefore, although there is no such procedural requirement, the summary constitutes the final stage of the occupational risk assessment at selected workplaces. The results of risk assessment enabled, in particular, to determine whether occupational risks at workplaces linked to hazards are properly mitigated. If not, what actions (corrective and / or preventive) should still be undertaken in order to eliminate or adequately reduce this risk.

Results of research - Occupational risk assessment at a selected workplace

During the research, the broad risk analysis was carried out at many different positions in the selected institution. However, for the purpose of presenting the method used and limited space of the article, the position of mechanic in the technical section of the support department was selected, due to a large number of potential threats which occur on that position. Therefore, it is a physical workplace with the use of hazardous machinery and equipment that was chosen as the only example for the risk analysis.

A detailed assessment was included in the risk assessment sheet, which contains the following elements: Job Description (Table 2); Identification of threats, their sources, possible effects and security measures (Table 3); Occupational Risk Assessment Sheet (Table 4); Employee's Occupational Risk Information Sheet (Table 5).

The carried out risk analysis showed that there are no irregularities related to work performed at the selected workplace. The implemented preventive measures fulfil their function and are sufficient. However, any deviation from the standard poses a hazard and also increases the risk category. At present hazard is at an acceptable level and therefore the workplace should be monitored on a regular basis so that the hazard category does not change. Regular training on health and safety and firefighting as well as job instructions are some of numerous risk prevention options at workplaces, as they play a key role in informing a worker of hazards and protecting him/her from possible accidents. Accident prevention is also the liability of an employee, who is responsible for informing about any events and signalling the wrong way of working on the site. It is also important to alert co-workers and rescue services to a possibility of hazard occurrence. Each event must be registered, including the indication as to where and when the event occurred, the event description and preventive measures and mitigating measures implemented.

Another important step in pre – and post-accident activities is monitoring workplaces, which is of particular importance due to the possibility of faster detection of undesirable effects in the work environment. Any irregularities should be reported promptly to an employer or a manager in charge of the establishment.

Current medical examinations, which every employee is obliged to possess, are also essential. Persons who control the validity of medical certificates should not allow employees who fail to provide valid examinations to perform work.

Conclusions

Analysing and assessing occupational risk is an important step to improve working conditions through identifying hazards that relate to a particular job position, and activities aimed at eliminating or minimizing them. In spite of the fact that there are many methods to analyse occupational risk, it should be mentioned that it is crucial to stimulate research into the practical risk control procedures adjusted to the local situation and „to select the method that is designed to suit their needs”. The conducted in the paper occupational risk assessment conducted with the use of a well-known and simple method but adjusted to local conditions assessment sheet has proved that in occupational risk assessment it is not important to use a highly developed method but rather a simple one, yet in a conscious way and adapted to the local situation. To sum up, it should be kept in mind that the right method is not a guarantee of success. Certain proficiency and experience of a person who will apply it is still necessary for proper assessment.

One of the most important advantages of the applied approach is a numerically expressed risk assessment. Of course, an approach based on figures allows prioritization, but will not be able to consider certain major aspects, such as ergonomics and psychosocial risks. Certain methods are difficult to apply, or even impossible, for chronic intoxication risk assessment, mental or physical fatigue assessment, etc. The method and a dedicated risk assessment sheet on



the one hand are easy to use and have a fairly universal character, but on the other hand, the method also has some limitations that result from its adjustment to the local conditions of the employer. However, the approach can serve as an example of using a simple method in the application to the specific requirements of the employer.

The carried out research is of a preliminary nature and needs to be continued. Further research will focus on comparing the applied method to alternative approaches to base further inference on triangulation principles. It is expected that, as a result of further research, greater versatility of the applied method will be achieved as well as the possibility of adapting it to specific work conditions, e.g. managers working in various cultural conditions, accountants in various organizations, IT specialists with various competences and equipment, teachers working with difficult youth, etc. It is planned that the final utilitarian effect of the research will be an adjusted IT system supporting risk analysis at workplaces.

To sum up, the provided case study has shown as well, that risk is permissible in all cases and no additional preventive actions are required. However, a failure to comply with existing safeguards or lack of them increase the risk and, as a result, increase the likelihood of an accident or disease. It is therefore advisable to carry out regular checks so that the state of the precautionary measures taken and implemented beforehand is supervised. However, an extremely important action in the process of OHS is to make employees and employers aware of harmful, hazardous or onerous to health factors that can occur when working at a position occupied.

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Przesłanki i skutki zastosowania metody Risk Score do oceny ryzyka zawodowego na wybranym stanowisku

Streszczenie

W artykule przedstawiono podstawy zarządzania ryzykiem, a zwłaszcza kwestie związane z metodyką oceny ryzyka zawodowego na wybranych stanowiskach pracy. Na potrzeby oceny ryzyka zawodowego w badanej instytucji zaproponowano metodę Risk Score oraz przedstawiono efekty tej oceny na przykładzie wybranego stanowiska z użyciem karty oceny ryzyka zawodowego, która została dostosowana do lokalnych uwarunkowań. Przygotowana

propozycja karty oceny ryzyka zawiera charakterystykę danego stanowiska pracy, identyfikację zagrożeń, ich źródeł, możliwych skutków i stosowanych zabezpieczeń na wybranym stanowisku oraz kartę zapoznania pracownika z oceną ryzyka zawodowego. Głównym założeniem dokonanej oceny ryzyka zawodowego było zbadanie możliwych zagrożeń, które występują w środowisku pracowniczym oraz możliwie najlepsze dostosowanie zabezpieczeń zapobiegających wystąpieniu niepożądanego zdarzenia.

Słowa kluczowe

zarządzanie ryzykiem, ocena ryzyka zawodowego, identyfikacja zagrożeń w środowisku pracy
