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CONTROL OF RISKS IN THE WORKPLACE AND FROM WORK EQUIPMENT

CONTROLE DE RISCOS NO LOCAL DE TRABALHO E PROVENIENTES DE EQUIPAMENTOS DE TRABALHO

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Abstract
A significant proportion of workplace injuries are caused by inadequate maintenance of the workplace and it is important to understand the different causes of accidents and the control strategies that can be applied to reduce them. The key elements of risk control, i.e. the occupational safety and health management system, are planning, organization, control, monitoring and review. The listed elements of risk control include eliminating or reducing risks by using appropriate control measures and defined work practices, involving employees and supervisors in the planning process by defining responsibilities for workplace maintenance, recording all irregularities and work on maintenance and remediation of the workspace, as well as conducting regular safety audits of workplace maintenance procedures. A large percentage of workplace injuries are related to work with equipment. Protective measures to achieve the necessary reduction of risks when working with equipment include safety measures in the design of equipment that eliminate hazards or reduce risks for employees using the equipment, the provision of protective and/or complementary protective measures that take into account the use and reasonably foreseeable misuse of the equipment, as well as the provision of information for the use of work equipment.

Resumo
Uma parcela significativa dos acidentes de trabalho é causada pela manutenção inadequada do local de trabalho, sendo importante compreender as diferentes causas de acidentes e as estratégias de controle que podem ser aplicadas para reduzi-los. Os elementos-chave do controle de riscos, ou de um sistema de gestão de segurança e saúde ocupacional, são planejamento, organização, controle, monitoramento e revisão. Os elementos do controle de riscos incluem a eliminação ou redução de riscos por meio de medidas de controle apropriadas e práticas de trabalho definidas, o envolvimento de funcionários e supervisores no processo de planejamento, definindo responsabilidades pela manutenção do local de trabalho, o registro de todas as irregularidades e trabalhos de manutenção e correção do local de trabalho, bem como a realização de auditorias de segurança regulares dos procedimentos de manutenção. Uma grande porcentagem dos acidentes de trabalho está relacionada ao trabalho com equipamentos. As medidas de proteção para alcançar a necessária redução de riscos ao trabalhar com equipamentos incluem medidas de segurança no projeto dos equipamentos que eliminam perigos ou reduzem os riscos para os funcionários que os utilizam, o fornecimento de medidas de proteção e/ou complementares que levem em consideração o uso e o uso indevido

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razoavelmente previsível dos equipamentos, bem como o fornecimento de informações sobre o uso dos equipamentos de trabalho.

Palavras-chave: *Acidentes de Trabalho. Perigos, Local de Trabalho e Equipamentos de Trabalho. Controle de Riscos. Medidas de Proteção.*

1 INTRODUCTION

Injuries to employees in the workplace, or in the work environment, often occur during their movement, slipping, tripping and falling, contact with objects and vehicles in the work environment, working at height, and often due to violence by other persons. Therefore, it is important to understand the different causes of accidents and the control strategies that can be applied to reduce them. Many of the risks associated with these hazards can be significantly reduced by an effective management system. In addition to an effective management system, it is necessary to comply with the appropriate requirements, or to implement appropriate preventive measures, in order to ensure a healthy and safe workplace (Jule, 2020).

Any equipment that employees use at work is generally covered by the term "work equipment", which is extremely broad and includes machines, devices, plants, installations, hand and power tools, as well as ladders, photocopiers, laboratory equipment, lifting equipment, forklifts, motor vehicles, etc. Practically everything used to do work, including employees' own equipment, is covered by the above term. The use of equipment for work includes starting or stopping equipment, repairing, modifying, maintaining, servicing, cleaning and transporting (Hughes & Ferrett, 2016).

The employer is obliged to ensure that work equipment is appropriate, maintained, inspected as necessary, to provide adequate information, instructions and that it is used only by trained employees.

A large percentage of occupational injuries are related to work with equipment, and various circumstances can increase the risk of using equipment, such as (Broadribb & Freiburger, 2018):

- failure to use appropriate equipment for a particular job (e.g., using ladders instead of accessible work platforms for work at higher heights),

- failure to install adequate controls on machinery, or installing the wrong type of controls, so that the equipment cannot be stopped quickly and safely, or can be started accidentally,
- improperly guarding machinery, leading to accidents caused by entanglement, cutting, crushing, catching or shearing,
- failure to maintain guards and other safety devices,
- failure to provide proper information, instructions and training,
- failure to install rollover protective structures and belts on mobile work equipment where there is a risk of rollover,
- failure to maintain work equipment or perform appropriate equipment inspections,
- failure to provide adequate personal protective equipment.

In addition to the identified risks, it is important to consider the following (Goetsch, 2019):

- the work that is performed during normal use of the equipment, as well as during installation, maintenance, cleaning and clearing of blockages,
- which employees will use the equipment, including those who are inexperienced, who have changed jobs or those who may have special difficulties (e.g., with speech and hearing),
- which employees may potentially behave irresponsibly, carelessly or make mistakes,
- guards or safety devices that may be poorly designed and difficult to use or easily destroyed,
- other characteristics of the equipment that may cause risks such as vibrations, electricity, wet or cold conditions, etc.

2 WORKING ENVIRONMENT

The employer is obliged to organize workplaces so that each employee can perform their work in a safe manner. From an ergonomic perspective, the worker should be at an appropriate height in relation to the work surface and there should be no need for excessive bending, stretching and standing. A suitable place to sit must be provided if the majority of the work can or must be done while sitting. The chair should have adequate support for the lower back and legs (for workers who cannot reach the floor with their

feet), be made of environmentally friendly materials, be stable and, if possible, have armrests. It is also worth noting that sitting for long periods of time can pose health risks, such as circulation problems, damage to the vertebrae and muscles.

The working environment also includes the provision of sanitary facilities, drinking water, places for clothing, changing rooms, rest and meals, and first aid. Sanitary facilities and washing facilities must be provided in proportion to the number of employees, as well as to provide special conditions for people with disabilities, separate facilities for men and women, and adequate protection from the weather. The premises should have adequate lighting and ventilation, and the floors and walls should be easy to clean. For certain activities, it is necessary that the premises also have a shower. Drinking water must be easily and adequately accessible to all employees. In the event that non-potable water is also available, it is necessary to have a system for supplying drinking water that is specially marked with the sign "drinking water". It is necessary to provide a dressing and changing area that is clean, safe, warm and dry with good ventilation. Such rooms are required when, due to work activities, workers need to change clothes, wear special clothing or protective clothing that prevents hazardous substances from getting on the workers' clothing. Rest and meal rooms should be organized in such a way that workers can sit without protective clothing during breaks. Special rest rooms should be provided for pregnant and breastfeeding mothers.

The ventilation of the workplace should be effective and free of any impurities, and the air inlets should not be located near potential pollutants (e.g., chimneys). Care should be taken to ensure that workers are not exposed to unpleasant draughts. The ventilation system should have an effective visual or audible device installed to indicate any malfunctions. Proper maintenance and record keeping are essential, and the supply of fresh air should not fall below 5-8 litres per second per employee. It should be ensured that any enclosed workplace is ventilated with a sufficient quantity of fresh or purified air. The fresh air should be free from pollutants such as vehicle exhaust fumes or emissions from chimneys.

During work, the temperature in the working and auxiliary premises in which the workplaces are located must be appropriate, depending on the method of work and activity, as well as the physical load of the employees, except in workplaces where it is required by the technological process. Minimum temperatures cannot be maintained where the premises are open to the outside or where food or other products must be at

lower temperatures. Heating or cooling must not be used in a workplace that has fumes or where it may lead to injury or discomfort to the worker.

Every workplace must have adequate and sufficient lighting, and where possible, natural light. Auxiliary lighting is also necessary in any room where workers are exposed to danger in the event of a breakdown (usually due to power failure and/or fire). Windows and skylights should be kept clear and free from obstructions as far as practicable, unless the obstruction is intended to protect the window, prevent excessive heat or glare. When selecting an appropriate lighting system, the following factors should be considered: the availability of natural light, the specific areas and processes, the type of equipment to be used and the need for specific local lighting, the characteristics of the light (type of light, colour, intensity and the possibility of adjusting it at the point of use), structural aspects of the work space, such as the use of screens in open-plan offices, the presence of atmospheric dust, the cleaning and repair of lamps and windows, and the need for emergency lighting (Benson *et al.*, 2021).

3 MOVING AROUND THE WORKPLACE

The most common hazards for pedestrians at work are slips, trips and falls on the same level, falls from a height, collisions with moving vehicles, impacts with moving, falling or flying objects and impacts with moving or stationary objects. Slips and trips are one of the most common causes of workplace injuries faced by pedestrians.

Slip hazards are caused by wet or dusty floors, spills of wet or dry substances (oil, water, flour and plastic pellets), loose rugs on slippery floors, wet and/or cold weather conditions, inappropriate footwear, floor coverings or sloping floors. Fall hazards are caused by loose floorboards or carpets, obstacles, low walls, low objects on the floor, cables across walkways or uneven surfaces, raised telephone and electrical sockets, rugs and mats (especially when placed on a polished surface), poor maintenance (obstacles left on walkways, rubbish not regularly removed), poor lighting levels (especially near stairs or other changes in level), sloping or uneven floors (especially where there is poor lighting or no handrails), and inappropriate footwear (shoes with slippery soles).

Collisions with moving vehicles can occur within the work site or on access roads around a building, particularly where there is no separation between pedestrians and vehicles. Poor lighting, blind spots, lack of warning signs and barriers at road crossings

also increase the risk of this type of injury. This is best prevented by completely separating pedestrians and vehicles, by providing well-marked, protected and maintained pedestrian paths. Appropriate guardrails and barriers should be installed at building entrances and exits and at blind spots at the end of racks in warehouses. Particular attention must be paid to areas where trucks are loading or unloading. It is important to provide separate doors for pedestrians and vehicles and all such doors should be equipped with a visible panel and an indication of the safe height if used by vehicles. Finally, the implementation of reasonable speed limits, together with speed regulation devices, is another effective control measure.

Injuries caused by moving and falling objects are the second leading cause of death in the construction industry. Moving objects include moving objects, moving parts of machinery or conveyor systems, and flying objects are often caused by the break-up of a moving part or the failure of a pressurized system. Falling objects are a major problem in construction (due to careless work at height) and in warehouses (due to careless stacking of pallets on racks). Objects falling from high shelves and moving loads also pose a significant hazard in many industrial sectors. Both groups should be protected by the use of covered walkways or suitable waste catch nets when there is a high risk. Waste material on the site should be brought to ground level using hoppers or cranes, and it should not be thrown from a height, and only minimal quantities of construction material should be placed on working platforms. Appropriate personal protective equipment (safety helmet or safety glasses) should be worn at all times when work is being performed.

Injuries due to hitting fixed or stationary objects are caused when there is a collision with a fixed part, usually a building structure or a stationary vehicle, etc. The head is the most vulnerable part of the body to this hazard and is most often caused by a misjudgement of the height of the obstacle. This hazard can only be effectively controlled if there are good standards of lighting and maintenance, defining paths and encouraging their use, using awareness-raising measures such as training and information in the form of signs or distinctive colours, and using appropriate personal protective equipment. Effective solutions to all of these hazards do not have to be expensive, time-consuming or complicated, and can be the result of careful and conscientious work by trained workers combined with an adequate workplace maintenance regime (Hughes & Ferrett, 2016).

Measures to reduce pedestrian hazards and promote good working practices include:

- providing adequate floor surfaces, lighting and carefully planning routes for vehicles and pedestrians,
- maintaining all work areas, especially walkways, and ensuring prompt remediation,
- providing adequate training for employees in the correct use of safety devices or cleaning equipment,
- providing an appropriate system for maintenance, cleaning, fault reporting and repairs, and
- ensuring that employees wear high-visibility clothing and appropriate footwear for the appropriate type of floor.

4 WORK AT HEIGHT

Work at height includes all work activities where there is a need to control the risk of falling from a distance that could cause injury, regardless of the work equipment used, the duration of the work at height or the height at which the work is performed. This includes, for example: working on scaffolding or from a mobile lifting work platform, covering a truck or working on a tanker, working on top of containers in docks or on a ship or warehouse, pruning trees and other forestry work at height, using baskets or ropes to access a building, climbing permanent structures such as portals or telephone poles, working near an excavation or basement opening, painting or pasting and putting up posters at height, working on theatrical stages, using ladders to clean windows on shelves and the like, working in a mine shaft or chimney, etc. (Goetsch, 2019).

Preventing falls from a height and mitigating worker falls if they occur requires:

- that work is not carried out at a height when reasonably practicable at ground level (e.g., assembly of components should be carried out at ground level),
- when work is carried out at a height, that appropriate measures are taken to prevent, as far as reasonably practicable, any person from falling from a distance that could cause injury (e.g., use of a guardrail), and

- that appropriate measures are taken to minimise the distance to the ground and the consequences of a fall (collective measures, e.g., airbags and safety nets, must take precedence over individual measures, e.g., seat belts).

The risk assessment for work at height should first consider whether the work can be avoided. If this is not possible, then the risk assessment should consider the following issues:

- the nature and duration of the work,
- the level of competence of the employees and any additional training requirements,
- the levels of supervision required,
- the use of guardrails, work platforms and means of access and egress,
- the required personal protective equipment (safety helmets and harnesses),
- the presence of fall arrest systems (nets or soft fall systems),
- the health of the workers,
- possible weather conditions, and
- compliance with regulations on work at height.

The Work at Heights Regulations require employers to ensure that:

- all work at height is properly planned and organised,
- employees are competent,
- the risks of working at height are assessed,
- appropriate work equipment is selected and used,
- the risks of working on or near fragile surfaces are properly managed, and
- equipment used for work at height is properly inspected and maintained.

When working at height, the hierarchy of measures should be respected, as follows:

- eliminate or avoid working at height,
- work from a secured surface (working platform with protective railings),
- ensure that there is sufficient work equipment or other measures to reduce the distance and consequences of a fall by using collective, rather than individual, measures (e.g., handrails instead of belts) or, where this is not feasible, collective fall arrest equipment (airbags or safety nets) or, where this is not feasible, individual safety belts (safety belts), and
- provide supervision, training and instructions.

5 TEMPORARY WORKS

Temporary works include maintenance and renovation works to buildings, which are usually carried out by contractors and often involve demolition of buildings and excavation work required to provide new underground services. The works must be properly planned and supervised, especially when they take place within a residential building or near other buildings. There are many other potential hazards associated with temporary works: slips, trips and falls, unfenced excavations, inadequate pit protection, uneven surfaces, poor reinstatement, power lines and cables (especially on stairs), oil and gravel spills, poor lighting and ventilation in and around temporary works, noise and vibration, hazardous materials including dust, falling or flying objects, accumulation of waste materials, moving equipment, poor storage of materials and equipment and other obstructions in public areas, fires and/or explosions. Several of these conclusions apply to a wide range of construction works, namely the lack of good communication, supervision, planning and risk assessment.

Important controls for work of a temporary nature are communication and cooperation between contractors and employees, a comprehensive risk assessment for the works, and project management and supervision to ensure that all agreed controls are implemented.

The risk assessment should include identification of the works, health and safety implications for employees, additional controls and procedures required to protect all those affected by the works, work equipment, personal protective equipment, work procedures, work permits and method statements to be used, details of access restrictions, changes to existing emergency procedures and access to the facility, and details of any necessary safety signs and/or barriers (Goetsch, 2019).

6 VIOLENCE AT WORK

Workplace violence is defined as any incident in which an employee is threatened, assaulted or abused in work-related circumstances. Workplace violence, particularly from dissatisfied customers, clients, claimants or patients, can cause stress and, in some cases, injury to employees. This is not just physical violence, as people can also face verbal and mental abuse, discrimination, harassment and bullying. Physical violence is still rare, but

violence of all kinds has increased significantly in recent years. Workplace violence can cause pain, suffering, anxiety and stress, which leads to higher financial costs. In this context, risky jobs include health and social services, police and firefighters, bailiffs, education, various service industries, etc. Employees who are at the greatest risk of workplace violence are those who handle money, provide services (sales, education and healthcare workers), work alone and represent authority (police, traffic officers).

Many people resort to violence due to frustrations, such as dissatisfaction with a product or service, including the price, the impression of being unjustly punished for an incident (e.g., parking a car incorrectly), or a general lack of information following a problem (e.g., flight delays, hospital services, etc.).

The employer has a general duty of care towards employees, which also covers the risk of violence at work, i.e., to ensure that employees are not exposed to unnecessary risks during work, including the risk of injury from other persons, usually service users. Accordingly, the employer is obliged to provide conditions for safe work, which can be implemented through the following activities: recognizing whether there is a problem, deciding what needs to be done, taking appropriate action and checking whether the action is effective.

A risk assessment should identify the hazards involved, and it is essential to record all incidents to gain a picture of what is happening during working hours. Consultation with employees at risk will improve their commitment to control measures and make precautions more effective. The level of training and information provided, together with the general working environment and job description, have a significant impact on the level of risk, and consideration may be given to the quality of service provided, the design of the working environment, the type of equipment used and the design of the work. Action plans should be drawn up and monitored in consultation with employees, and procedures should be regularly reviewed and amended if they are not working as intended (Park & Jang, 2019; Draper, 2022; Mopkins, 2022).

7 PREVENTING ACCESS TO HAZARDOUS EQUIPMENT PARTS

The employer must take effective measures to prevent access to dangerous parts of machinery or to stop their movement before any part of the employee's body enters the

danger zone of the equipment. The term "dangerous part" is a part of work equipment which, if used in a normal/foreseeable manner, may cause injury to the employee.

The risk assessment should identify the hazards associated with the machinery. The risk assessment should assess the nature of the injury, its severity and the likelihood of occurrence for each identified hazard. This will enable employers to decide whether the level of risk is acceptable or whether risk reduction measures are needed. In most cases, the aim of risk reduction measures is to prevent contact of body parts or clothing with any hazardous part of the machine (e.g., by installing guards) (Haghighi *et al.*, 2019).

Risk reduction measures are ranked in the order in which they should be implemented, where feasible, to achieve an adequate level of protection (Athar *et al.*, 2019).

The levels of protection are:

- fixed fences,
- other guards or protective devices such as interlocking guards and pressure mats,
- protective devices such as templates, holders and rods, etc., and
- provision of information, instruction, training and supervision.

The purpose of the risk assessment is to identify measures that can be taken to reduce the risk posed by the hazards. When selecting measures, the employer should take into account each level of protection from the first level of the above scale and use measures from that level as far as it is feasible to do so, provided that they contribute to reducing the risk. It is often necessary to select a combination of the above measures. The selection process should continue at a lower level until the combined measures are effective in reducing the risk to an acceptable level.

When selecting the appropriate combination, employers must take into account:

- work requirements,
- risk assessment, and
- technical characteristics of possible protective solutions.

Any risk assessment must also include activities such as the adjustment, maintenance, cleaning and repair of equipment. The assessment may indicate that these activities require a different combination of protective measures than those appropriate for equipment operating in normal mode. Parts of equipment that are not dangerous in normal use, because they are not accessible, may become accessible and therefore dangerous while this type of work is being carried out. Certain adjustment operations that

must be performed while the equipment is operating may require greater reliance on the provision of information, instructions, training, and supervision than for normal use.

8 USE AND MAINTENANCE OF EQUIPMENT WITH SPECIFIC RISKS

Some pieces of work equipment involve specific risks to safety and health where it is not possible to adequately control the hazards by physical measures alone. Repairs, modifications, maintenance or servicing of the equipment is also restricted to a designated person, who may be the operator if he has the necessary skills and has undergone special instruction and training. Another person who is specially trained to perform a particular maintenance task may not be the operator, but may be assigned to perform this type of servicing task on multiple pieces of equipment (Okareh *et al.*, 2021).

Employees who use and maintain work equipment, where there are residual risks that cannot be sufficiently reduced by physical means, should be provided with sufficient information, instruction and training for safe operation. Managers should also be provided with sufficient information about the equipment to enable them to fulfil their responsibilities towards employees who use and maintain the equipment.

Information and instructions are provided by the manufacturer in the form of a user and maintenance manual. It is the employer's responsibility to ensure that what is provided is easy to understand and is presented logically using illustrations and standard symbols where appropriate. The information should be written in Serbian, i.e., in a language that the employee understands (Chinniah *et al.*, 2018).

The extent of the information and instructions depends on the complexity of the equipment and the specific risks associated with its use, and should include:

- all aspects of safety and health,
- any limitations on the use of the equipment,
- any foreseeable problems that may arise,
- safe methods for solving problems, and
- any relevant experience with the equipment that would reduce risks or help others to work more safely, will be recorded and forwarded to everyone concerned.

9 MAINTENANCE OF WORK EQUIPMENT

Work equipment needs to be properly maintained to continue to operate safely and in the manner it was designed to operate. The frequency of maintenance will be specified in the manufacturer's instructions and will depend on the period of use, the working environment and the type of equipment. High-speed, high-risk equipment, which is used extensively in harsh environments such as saltwater, may require very frequent maintenance, while a simple hand tool, such as a shovel, may require very little.

Maintenance management schemes can be based on a number of techniques designed to focus on those parts that are deteriorating and that need to be maintained to prevent health and safety risks (Chinniah et al., 2017).

These techniques include the following:

- preventive planned maintenance – this involves replacing parts and consumables or making necessary adjustments at predetermined intervals, usually specified by the manufacturer, so that there are no hazards arising from component deterioration or failure (e.g., vehicles),
- condition-based maintenance – this involves monitoring the condition of critical parts and performing maintenance when necessary to avoid hazards that might otherwise arise, and
- failure-based maintenance – here maintenance is carried out only when errors or failures have occurred. This is acceptable only if the failure does not pose an immediate hazard and can be corrected before the risk increases.

In the context of occupational health and safety, maintenance is not about operational efficiency, but only about avoiding risks to employees. It is necessary to ensure that maintenance work can be carried out safely, which includes the following:

- competent, well-trained maintenance employees,
- equipment is safe for carrying out maintenance work. In many cases, normal safety precautions for working with equipment may not be sufficient, as maintenance sometimes involves removing guards to inspect and subsequently adjust, lubricate, or repair the equipment,
- a safe system of work that is used to implement the necessary procedures for safely maintaining equipment and performing maintenance tasks. This can often include

a formal scheme, a procedure to ensure that the correct sequence of safety-critical tasks is performed and that all necessary precautions are taken, and

- the correct tools and safety equipment are available to perform maintenance work without risk to employees.

10 WORK AND WORK ENVIRONMENT

For safe operation of work equipment, it must be equipped with easily accessible controls, be stable, properly lit, clean and equipped with appropriate signs and warning symbols.

The equipment must be equipped with effective means for:

- starting,
- stopping under normal circumstances, and
- emergency stopping when necessary to prevent danger.

All controls should be well positioned, clearly visible and identifiable, so that it is easy for the operator to know what each control does. Labels should be clearly visible and remain so under the conditions encountered at the workplace.

Equipment controls should:

- be easily accessible from operating positions,
- not allow accidental movement of the equipment,
- move in the same direction as the movement being controlled, differ in mode, shape and direction of movement to prevent unintended operation of the wrong control,
- include adequate red emergency stop switches, and
- have a covered or recessed green button for start-up to prevent accidental start-up of the equipment and to be clearly marked.

The equipment for work shall be capable of being started only by the use of a designed starting control, whereby the equipment may have a starting sequence that is electronically controlled so that certain conditions are met before starting can be achieved. Restarting after a stop shall require the same sequence of commands to be executed.

In the event of equipment stopping, whether intentionally or as a result of opening a locked guard or accidentally activating a switch, it should not be possible to restart the equipment simply by switching off the protection. Any change in operating conditions,

such as speed, pressure or temperature, should only be made using controls designed for that purpose.

The operation of normal stop controls should bring the equipment to a safe state in a safe manner. In some cases, an instantaneous stop may cause other risks. Stop controls do not have to be instantaneous and may bring the equipment to rest in a safe sequence or at the end of an operating cycle. Only parts necessary for safety, or accessible dangerous parts of the equipment, must be stopped.

An emergency stop must be provided where other protective measures are not sufficient to prevent danger to operators and any other persons who may be injured. Where appropriate, an emergency stop should be provided at each control point and at other locations around the equipment so that action can be taken quickly. Emergency stop should stop the equipment quickly, but this should be controlled where necessary so that additional hazards are not created. Shutdown of complex systems in the event of a failure must be carefully designed to optimize safety without introducing additional risks. Emergency stops are not a substitute for effective guarding of hazardous equipment and should not be used for normal equipment shutdown. Emergency stop switches should be easily identifiable and accessible, and common types are mushroom buttons, rods, levers, foot plates, or pressure-sensitive cables (Gauthier *et al.*, 2021).

11 EMPLOYEE RESPONSIBILITIES

The responsibilities of employees as users of equipment include:

- to exercise reasonable care for themselves and others who may be injured, and
- to cooperate with the employer.

Employees are required not to abuse or disrupt safety provisions, i.e., to use equipment properly in accordance with instructions and training, as well as to inform employers about dangerous situations and shortcomings in safety procedures.

When employees provide their own tools, the employer still has a responsibility to ensure that the work equipment is suitable. It is not always possible to eliminate every hazard or to design protective measures that protect employees from all risks, especially during start-up, adjustment, cleaning and maintenance.

12 CONCLUSION

The key elements of risk control, or an occupational health and safety management system, are planning, organization, control, and monitoring and review. The listed elements of risk control include eliminating or reducing risks by using appropriate control measures and defined work practices, involving employees and supervisors in the planning process by defining responsibilities for workplace maintenance, recording all irregularities and work on maintenance and remediation of the workplace, as well as conducting regular safety audits of workplace maintenance procedures.

Protective measures to achieve the necessary risk reduction when working with equipment are taken as follows: inherent safety design measures that eliminate hazards or reduce risks for employees using the equipment; providing protective and/or complementary protective measures that take into account the use and reasonably foreseeable misuse of the equipment and providing information for use that includes: operating procedures, recommended safe working practices, warnings of residual risks and other information for the different stages of the equipment's life cycle and a description of the required personal protective equipment. When analysing the risks of work equipment, the following checklist of questions can be applied: is the equipment suitable for the intended work task, is all the necessary safety devices installed and working properly, is there adequate instructions for the equipment, is the area around the machine safe and level without obstacles, is adequate lighting provided, is adequate ventilation provided where necessary, has an assessment been made risk to determine the necessary competence or training requirements for the control of certain equipment, whether machine operators are trained and have sufficient information, instructions, training, whether employees are adequately supervised, whether safety instructions and procedures are implemented and respected, whether machine operators use appropriate work clothes without loose sleeves, open jackets, hanging jewellery or sandals, whether the employer has provided all necessary personal protective equipment, whether guards or safety devices are used correctly, whether maintenance is carried out correctly and safely, whether hand tools are used correctly and maintained properly, and whether they are used only by employees who have undergone appropriate training.

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AUTHOR PARTICIPATION

All of the authors participated in the discussions of the results and reviewed and approved the final work.

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Authors' Contribution

All authors contributed equally to the development of this article.

Data availability

All datasets relevant to this study's findings are fully available within the article.

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