

Introduction

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While adjusting a conveyor belt, a millwright is drawn into the unguarded tail drive of a belt conveyor and suffers fatal crushing injuries. A young worker feeding sheet rubber into a guillotine shear loses both hands when the machine cycles unexpectedly. A lumber piler cleaning up around a lumber sorting table (green chain) is strangled when his loose clothing is caught on an exposed keyway at the end of a slowly rotating shaft.

These are three examples of serious injury or death resulting from unguarded or inadequately safeguarded machinery and equipment, which can happen in any workplace that uses powered equipment.

Each year, physical contact with machines and powered equipment account for a significant number of life-altering injuries, including amputations and disfigurement, and may also result in the death of a worker. Most of these accidents can be prevented by effective safeguarding, lockout procedures, and supervision and training.

Why is safeguarding important? It is impossible to predict what people will do around powered machinery, no matter what their level of experience or training. Effective safeguarding protects against both human error and lapses in judgment, as well as accidental contact with moving parts.

Who should read this manual?

This manual is for everyone who owns, operates, maintains, or sells powered machinery and equipment.

- Employers will find information to help them comply with the Occupational Health and Safety Regulation (OHSR) and Part 3 of the *Workers Compensation Act*. It will also help them exercise due diligence in providing a safe work environment.
- Supervisors will find information to help them assess the risks to their workers from harmful contact with machinery and equipment. It will also help them evaluate safeguarding solutions that satisfy the competing needs of safety, production, and quality assurance.
- Workers will gain greater awareness of the hazards associated with equipment operation and maintenance and of the safeguarding protection they have a right to expect.
- Suppliers will understand what they must do to provide machinery and equipment that conform to the *Workers Compensation Act* and the OHSR. They will have a quick reference to different options for meeting this responsibility.

Accidents associated with unguarded equipment and machinery often result in injuries, amputations, or death.

This manual will also be useful to personnel involved in risk assessment, maintenance, and operations management; health and safety committees; and safety professionals.

Using this manual

This manual provides general information that employers can use to develop safeguarding solutions for their specific machinery and equipment. It is not a complete “how-to” guide to safeguarding. Each safeguarding situation should be evaluated on its own merits and the general principles described here should be applied. This manual does not provide “blueprint” solutions or replace the need for employers to consult the relevant standards *and manufacturers’ recommendations* when faced with technically complex safeguarding problems.

Note the following:

- In this manual, the word “must” indicates that a particular requirement is found in the OHSR or a referenced standard. Requirements for safeguarding of machinery are found in Part 12 of the OHSR, which refers to *Canadian Standards Association (CSA) Standard Z432, Safeguarding of Machinery*.
- The word “should” indicates that a particular course of action, although not specified in the OHSR, will improve safety in the workplace.
- In the OHSR, the word “worker” includes supervisors, managers, and workers.
- The information provided in this manual is for general application and is not intended to replace the contents of the standard.

The relationship between safeguarding and lockout

It is important to distinguish between safeguarding and lockout. **Safeguarding** is the first line of defence in ensuring the safety of workers operating powered machinery and equipment. **Lockout** protects workers when machinery or equipment is shut down for maintenance (including repairs and clearing jams). In all cases, training and supervision are essential to ensure worker safety around machinery. For information on WorkSafeBC requirements for locking out equipment, please see the WorkSafeBC booklet *Lockout*.

Safeguarding	Training and supervision	Lockout
Protects workers when machinery or equipment is in operation (OHSR, Part 12)	Needed for all aspects of equipment operation and maintenance (<i>Workers Compensation Act</i> , Sections 115-17)	Protects workers when machinery or equipment is shut down for maintenance (OHSR, Part 10)

“Guarding” and “safeguarding”

The terms “guarding” and “safeguarding” tend to be used interchangeably, but they have precise meanings in the language of machinery and equipment safety.

Safeguard is the umbrella term for a number of measures that provide workers with effective protection from harmful contact with hazardous moving parts or other harmful conditions. Safeguards include barrier guards, safety devices, shields, awareness barriers, warning signs, or other appropriate means, used singly or in combination.

Guard and **barrier guard** refer to a specific type of safeguard. Guards are physical barriers or covers designed, constructed, and installed over moving parts to prevent any contact with them. Guards are the simple solution to protecting workers when access to moving parts, such as belts and drive chains, is not required during operation. They are reliable and cost-effective, and require low maintenance when properly designed and installed.

Safeguarding devices include a number of alternatives to barrier guards, such as interlocked movable barrier guards, two-hand controls, and electronic presence-sensing devices such as light curtains and pressure-sensitive mats. These solutions are more complex and technical but may be the only solution when access to danger areas is required during normal operation, such as when materials are fed into a machine for processing.

Parts 3 and 4 of this manual provide detailed information about the characteristics, advantages, limitations, and selection of guards and safeguarding devices.

Barrier guards—such as physical barriers or cover—are a simple and reliable solution to protecting workers when access to moving parts is not required during operation. Safeguarding devices—such as interlocks, two-hand controls, and light curtains—are more complex and technical but may be the only solution when access to danger areas is required during normal operation.

Requirements for safeguarding powered machinery and equipment are found in Part 12 of the OHSR.

Application of the OHSR and relevant standards

Requirements for safeguarding powered machinery and equipment are found in the OHSR, mainly in Part 12, Tools, Machinery and Equipment. The general safeguarding requirements of Part 12 always apply, even if there is also a specific code or standard covering a particular device.

Various standards organizations in North America, Europe, and around the world have produced written standards for almost all types of powered machinery. These publications are an excellent resource in determining how to safeguard specific types of equipment not mentioned in the OHSR. The WorkSafeBC library can help you access these publications. Appendix 3 of this manual provides a list of standards referred to in the OHSR.

Web-based resources

Links to WorkSafeBC online resources related to safeguarding can be found at WorkSafeBC.com, under Safety at Work. Links to other web sites with information about safeguarding are also provided.