

Training Circular



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Machine Guarding Safety

Machine guarding is a safety feature on or around manufacturing or other engineering equipment consisting of a shield or device covering hazardous areas of a machine to prevent contact with body parts or to control hazards like chips or sparks from exiting the machine.

Overview

Moving machine parts have the potential to cause severe workplace injuries, such as crushed fingers or hands, amputations, burns, or blindness. Safeguards are essential for protecting workers from these preventable injuries. Any machine part, function, or process that may cause injury must be safeguarded. When the operation of a machine or accidental contact injure the operator or others in the vicinity, the hazards must be eliminated or controlled. This circular contains general information on the various hazards of mechanical motion and techniques for protecting workers.



Types of Hazards

A wide variety of mechanical motions and actions may present hazards to workers operating or working around machinery. The three basic types of hazardous mechanical motions and actions are:

- **Hazardous Motions** – including rotating machine parts, reciprocating motions (sliding parts or up/down motions), and transverse motions (materials moving in a continuous line);
- **Points of Operation** – the areas where the machine cuts, shapes, bores, or bends the stock being fed through it;
- **Pinch Points and Shear Points** – the area where a part of the body or clothing could be caught between a moving part and a stationary object. This would include power transmission parts such as flywheels, pulleys, belts, chains, couplings, spindles, cams, gears, connecting rods and other machine components that transmit energy.

Reduce Risk

Having an understanding of how a machine works, and how the guards can protect you will result in a reduced risk of injury. All guards must:

- **Prevent contact** – machine guards must provide a physical barrier that prevents the operator from having any part of his/her body in the “danger zone” during the machine’s operating cycle;
- **Be secured in place or otherwise be tamper proof** – machine guards must be secure and strong so that workers are not able to bypass, remove, or tamper with them. They must be attached to the machine where possible. If the guard cannot be physically attached to the machine it must be attached elsewhere;
- **Create no new hazard** – a safeguard defeats its own purpose if it creates a hazard of its own such as a shear point, a jagged edge, or an unfinished surface which can cause a laceration. The edges of guards, for instance, should be rolled or bolted in such a way that they eliminate sharp edges. Machine guards should not obstruct the operator’s view;
- **Allow for lubrication with the guard still in place** - if possible, one should be able to lubricate the machine without removing safeguards. Locating oil reservoirs outside the guard, with a line leading to the lubrication point, will reduce the need for the operator or maintenance worker to enter the hazardous area;
- **Not interfere with the machine operation** - any safeguard which impedes a worker from performing the job quickly and comfortably might soon be overridden or disregarded. Proper safeguarding can actually enhance efficiency since it can relieve the worker’s apprehensions about injury.

Five Methods of Safeguarding

There are five general types of machine safeguards that can be used to protect workers and personnel in the immediate vicinity of machinery. They are:

1. **Guards** – these are physical barriers that prevent contact. They can be fixed, interlocked, adjustable, or self adjusting.
2. **Devices** – these limit or prevent access to the hazardous area. These can be presence-sensing devices, pullback or restraint straps, safety tip controls, two handed controls or gates.
3. **Automated Feeding and Ejection Mechanisms** – these eliminate the operators exposure to the point of operation while handling stock.
4. **Machine Location or Distance** – this method removes the hazards from the operators work area.
5. **Miscellaneous Aids** – these methods can be used to protect both operators and people in the immediate area. To include shields that contain chips, sparks, flying debris or sprays.



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Comments, suggestions and safety related items are welcome.

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References: ♦ osha.gov (standard 1910, subpart O) ♦ hs.uscb.edu ♦