



Machine Safeguarding



The Importance of Safeguards

There seem to be as many hazards created by moving machine parts as there are types of machines. Safeguards are essential for protecting operators from preventable injuries. The Occupational Safety and Health Administration (OSHA) requires safeguarding any machine where machine parts, functions or processes may cause injury. When the operation of a machine or accidental contact with it can injure the operator or others in the area, the hazards must be controlled or eliminated.

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Where Mechanical Hazards Occur

Dangerous moving parts in the following three basic areas require safeguarding:

The point of operation: The point where work is performed on the material, such as cutting, shaping, boring or forming of stock.

Power transmission apparatus: All components of the mechanical system that transmit energy to the part of the machine performing the work. These components include flywheels, pulleys, belts, connecting rods, couplings, cams, spindles, chains, cranks and gears.

Other moving parts: All parts of the machine which moves while the machine is working, including reciprocating, rotating and transverse moving parts, as well as feed mechanisms and auxiliary parts of the machine.

Types of Machinery Hazards

Motions

- Rotating (including in-running nip points)
- Reciprocating
- Transverse

Actions

- Cutting
- Punching
- Shearing
- Bending

Machine Safeguarding Methods

There are many ways to safeguard machines. The type of operation, the size or shape of stock, the method of handling, the physical layout of the work area, the type of material and production requirements will help to determine the appropriate safeguarding method for the individual machine. One must always choose the most effective and practical means available. Safeguards can be grouped under four general classifications.

Fixed

This type of guard is a barrier or enclosure that permits material to enter into the operation zone, but not the operator's body or body parts. The guard may be constructed of sheet metal, screen, wire cloth, bars, plastic or any other material that is strong enough to withstand impacts.

Interlocked

When this type of guard is opened or removed, the piece of equipment cannot operate or cycle until the guard is back in place. This type of guard may be electrical, mechanical, hydraulic, pneumatic power or any combination of these.

Adjustable

This type of guard permits the opening size for stock feed to be adjusted based on size.

Self-adjusting

Opening this guard type is determined by stock movement. As the stock is moved into the danger area, the guard is pushed up or away. This permits only the stock to enter.

Requirements for Safeguards

Safeguards must meet the following minimum requirements:

Prevent contact: The safeguard must prevent hands, arms and all other body parts from making contact with dangerous moving parts. A good safeguarding system eliminates the possibility of the operator or other workers being too close to hazardous moving parts.

Secure: Workers should not be able to easily remove or tamper with the safeguard. Guards and safety devices should be made of durable material that will withstand the conditions of normal use. They must be firmly secured to the machine.

Protect from falling objects: The safeguard should ensure that no objects can fall into moving parts. A small tool which is dropped into a cycling machine could easily become a projectile that could strike and injure someone.

Create no new hazards: 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 sharp edges are eliminated.

Create no interference: Any safeguard that impedes a worker from performing the job quickly and comfortably might soon be disregarded. Proper safeguarding can enhance efficiency since it can relieve workers' apprehensions about injury.



Allow safe lubrication: If possible, one should be able to lubricate the machine without removing the 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.

Safeguarding Terminology

Guarding

Any means used to effectively prevent personnel from coming in contact with moving machinery or equipment parts that could cause physical harm to the operator or passers-by.

Enclosures

Guarding by fixed physical barriers that are either mounted onto or around the moving parts of the machine or equipment.

Fencing

A locked fence or rail enclosure that restricts access to the machine, except by authorized personnel. The dangerous operation of the machinery must be at least 42 inches away from the fencing.

Location

Guarding may be accomplished by the physical inaccessibility of a particular hazard under normal operating conditions or use.

Point of Operation

Location on a piece of equipment where the material is positioned for processing or change, and where the work is actually being performed.

Power Transmission

All mechanical components — such as gears, cams, shafts, pulleys and belts — that transmit energy and motion from one power source to the point of operation.

In-going Nip Points

The area created by two or more mechanical components rotating in opposite directions in the same plane and in close conjunction.

Shear Points

The area created by the sliding motion of the mechanical component past a stationary point on the piece of equipment.



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Reference: Occupational Safety and Health Administration. "Concepts and Techniques of Machine Guarding" OSHA 3067 www.osha.gov/Publications/Mach_SafeGuard/toc.htm

