

## Machine Guarding

Hazards that exist which require machine guarding are those created by point of operation, ingoing nip points, rotating parts, flying chips and sparks. Examples of guarding methods are barrier guards, two-hand tripping devices, electronic safety devices, etc.

General requirements for machine guards:

- Guards should be affixed to the machine where possible
- Guard should only be secured elsewhere if attachment to the machine is not possible
- A guard should not create an accident hazard in itself

Point of operation guarding:

- Point of operation is the area on a machine where work is actually performed upon the material being processed

The point of operation of a machine is where the operation exposes an employee to injury and must be guarded. The guarding device must conform with any appropriate standard. If there is no specific standard, a guard must be designed and constructed to prevent the operator from having any part of his body in the danger zone during the operating cycle.

Special hand tools may be used for placing and removing material into and out of the machine to keep the operator from placing a hand in the danger zone. These tools may NOT be used in lieu of required guarding. Hand tools can only be used to supplement protection provided.

All machines consist of three fundamental areas; the point of operation, the power transmission device, and the operating controls. Despite all machines having the same basic components, their safeguarding needs widely differ due to varying physical characteristics and operator involvement.

**Point of operation** - 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 which 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.

Actions:

- Cutting
- Punching/impacting
- Shearing
- Bending

## Minimum Safeguards:

- **Prevent contact:** The safeguard must prevent hands, arms, and any other part of a worker's body from making contact with dangerous moving parts. A good safeguarding system eliminates the possibility of the operator or another worker placing parts of their bodies near hazardous moving parts.
- **Secure:** Workers should not be able to easily remove or tamper with the safeguard, because a safeguard that can easily be made ineffective is no safeguard at all. Guards and safety devices should be made of durable material that will withstand the conditions of normal use. They must firmly be 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 they eliminate sharp edges.
- **Create no interference:** 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 as it can relieve the worker's 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.

**Operating controls - other moving parts** - refers to all parts of the machine which move while the machine is working. These can include reciprocating, rotating, and transverse moving parts, as well as feed mechanisms and auxiliary parts of the machine.

### **General Requirements**

Crushed hands and arms, severed fingers and limbs, lacerations and abrasions - the list of possible machinery-related injuries is long and horrifying. Many hazards are created by moving machine parts. Safeguards are essential for protecting workers from preventable injuries.

The following standards have been established to ensure the safety of machine operators and other employees in the area:

- Machine Guarding - The purpose of machine guarding is to protect the machine operator and other employees in the work area from hazards created by ingoing nip points, rotating parts, flying chips & sparks. Some examples of this are barrier guards, light curtains, two-hand operating devices etc.
- Point of Operation Guarding - The point of operation is the area on a machine where work is performed.
- Additional Guarding - The following is a list of machines that usually require point of operation guarding: Guillotine cutters, Shears, Alligator shears, Power presses, Milling machines, Power saws, Jointers, Portable power tools, Forming rolls and Calenders,
- Barrels, Containers, and Drums - Revolving barrels, containers, and drums must be guarded by an enclosure interlocked with the drive mechanism, so the barrel, gun, or container cannot revolve unless the guard enclosure is in place
- Exposure of Blades - When the periphery of the blades of a fan is less than seven (7) feet above the floor or working level, the blades must be guarded. The guard must not have openings larger than one-half (1/2) inch.
- Anchoring Fixed Machinery - A machine designed for a fixed location must be securely anchored to prevent walking or moving.
- Eye and Face Protection - Eye and face protection must be provided to each employee when exposed to eye or face hazards from flying particles
- Lockout/Tagout - The employer must establish an energy control program consisting of energy control procedures, employee training, and periodic inspections to ensure that before any employee performs any servicing or maintenance on a machine or equipment, the machine or equipment is isolated from the energy source and rendered inoperative.

### **Hazardous Motions and Actions**

A wide variety of mechanical motions and actions may present hazards to the worker.

Motions:

- Movement of rotating members
- In-running nip points
- Reciprocating arms
- Moving belts
- Meshing gears