



Risk Control

Machine Guarding

Many employees in manufacturing environments are exposed to machinery. Working with machinery results in approximately 18,000 amputations, lacerations, crushing injuries and abrasions every year, as well as over 800 deaths. Manufacturing accounts for half of all amputations. Caught In is one of OSHA's Fatal Four Hazards. Most machines present hazards such as in-running nip points, rotating equipment, flying chips or sparks, belts or gears, and parts that impact or shear. Employees are at risk of getting caught in or struck by these parts.

The four main parts of a machine are:

1. Point of operation – the point where the work is performed on the material, such as cutting, shaping, boring, or forming of stock
2. Power transmission device – transmits energy to the part of the machine performing the work. This includes flywheels, pulleys, belts, connecting rods, couplings, cams, spindles, chains, cranks, and gears.
3. Operation of controls – control mechanisms such as foot pedals, buttons, etc.
4. Other moving parts – can include reciprocating, rotating and transverse moving parts, feed mechanisms and auxiliary parts of the machine

Because operators must interact with the stock and the machine, machine guarding is necessary to protect the operator. Machine guarding should generally follow these principles:

- Prevent contact between hazardous moving parts and the operator's body or clothing
- Not be easily removed
- Protect from objects falling into machinery
- Present no new hazards and not interfere with the job
- Allow safe lubrication without removing guards where possible



Types of Guarding Methods

There are two main types of guarding methods: guards and devices. There are various types of each.

Guards:

- Fixed – permanent part of the machine (this is preferable, as it cannot be easily removed by operators)
- Interlocked – stops motion when guard is opened or removed
- Adjustable – barrier may be adjusted for variable operations
- Self-adjusting – adjusts according to size/position of material

Devices and Controls:

- Pullback/restraints – restrain operator's arms from entering the point of operation (this is not preferable, as they must be adjusted for each operator and can easily be adjusted to allow reach into point of operations)
- Two-hand controls – requires constant pressure on both pads to activate the machine, keeping hands at a safe distance while the machine is in cycle
- Gate – must close fully to protect user before cycle will begin

- Light curtain – device outside the perimeter of the danger area. The machine will shut down if the light beam is broken by a person or object entering the danger area. A variation on this is an infrared curtain, which shuts down if an object with thermal energy (e.g. human skin) breaks the barrier. This is a good alternative for machines that require stock to be pushed or placed into the point of operation, such as punch presses or shears
- Physical barrier – physical barriers such as fencing can prevent employees from entering dangerous areas with automated, moving parts
- Location/distance – operating controls can be placed away from the machine so that the employee must remain at a safe distance in order to operate the machine



Machine Guarding Program

Management:

- Develop a formal policy to:
 - Ensure all machinery is properly guarded
 - Provide training for supervisors, employees, and maintenance

- Require the use of guards at all times when operating a machine
- Maintain and replace guarding as needed
- Review and update policy as needed

Supervisors:

- Train employees on specific guard rules in their areas
- Ensure machine guards remain in place and are functional
- Immediately correct machine guard deficiencies

Employees:

- Do not remove guards unless machine is locked and tagged
- Report machine guard problems to supervisors immediately
- Do not operate equipment unless guards are in place

Maintenance:

- Regularly inspect guarding
- Repair or replace guarding as needed
- Evaluate the guarding needed for new equipment or when changes are made to equipment

Operators/affected employees should receive training on:

- Hazards associated with particular machines
- How the safeguards provide protection and the hazards for which they are intended
- How and why to use the safeguards
- How and when safeguards can be removed, and by whom
- What to do if a safeguard is damaged, missing or unable to provide adequate protection

Additional Information

For more information, reference OSHA 1910 Subpart O.

To learn more about how to manage your risks and increase efficiencies, please contact CNA Risk Control at RiskControl@cna.com or visit cna.com/riskcontrol.