



Safety

Choosing the Best Machine Guard, from Old-School to High-Tech

James Langford | Oct 31, 2024

The reports by government agencies in the late 19th century were growing increasingly disturbing: The mechanical production equipment that was turbocharging American manufacturing was proving dangerous and often deadly to the workers operating it.

Inexperienced, and often young, factory employees were encountering not only unhealthy working conditions but “dangerous machines, and a confusing jumble of belts, pulleys and gears,” according to *U.S. Labor Department archives*.

Making their workplaces safer would prove a daunting, complex task that took decades, but among the earliest steps was a requirement that manufacturers set up machine guards, written into the nation’s first factory inspection law—in Massachusetts—in 1877.

By 1890, 13 states would require **machine guards**, devices that would take on an increasingly important role as health and safety programs grew.

First Line of Defense

Federal regulations requiring them would number among the first rules enacted by the newly established U.S. Occupational Safety and Health Administration in the **early 1970s**, and they remain a vital component of manufacturing safety today.

“Machine guards serve as the first line of defense against workplace injuries and fatalities,” providing physical barriers between workers and moving parts, sharp edges or high-temperature surfaces, Belt Conveyor Guarding, a maker of safety guards, explains in a **blog post**. “Investing in proper machine guarding is not just a safety measure, but a smart risk management strategy.”

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Injuries resulting from contact with objects and equipment, a category that includes machinery wounds, are the third-leading cause of work-related deaths, according to the ***National Safety Council***. They're also the third-leading cause of cases requiring time away from work, the organization says.

Guards are just one component of a comprehensive equipment-safety program to prevent such outcomes. Others may include pullback or restraint straps, safety trip controls, two-hand controls, automated feeding mechanisms and separating work areas from equipment hazard points.

While determining which devices and systems are necessary to keep workers sufficiently safe can be confusing, the American National Standards Institute, or ANSI, provides a framework for assessing risk and choosing equipment in its ***B11 standards for machinery safety***.

Equipment-Related Injuries and Deaths

The voluntary standard-setting organization's approach focuses on identifying who will interact with a machine, what their duties are and the hazards associated with them, according to a post on the ***American Society of Safety Professionals website***.

"As an employee, you may become accustomed to doing things in a certain way or have tasks flowing a certain way and grow oblivious to the hazards that may be ever present around your piece of equipment," ***OSHA explains*** in a brochure detailing machine guard requirements. "With complacency, there is a sense of numbness that develops to hazards. Employees must be on guard."

Along with worker injuries, lost productivity and expensive healthcare claims, failing to ***comply with OSHA's machine-guarding requirements*** can lead to stiff regulatory fines.



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The agency imposed roughly **\$14 million** in fines for violations of Standard 1910.212 in the year through September, 83 percent of them on manufacturing companies.

Generally, machine guards should prevent contact between equipment operators and danger zones, be secured in place, not create a new hazard and not interfere with equipment operation, which might prompt workers to override or work around the guard, the agency says.

Potential danger zones in manufacturing facilities include areas where parts are engaged in hazardous motions, points where machines cut, shape, bore or bend feedstock and pinch points or shear points.

Machine Guard Types: Pros and Cons

"Each type of machine guard plays a vital role in protecting workers from the hazards of industrial environments," says **HSI**, a provider of safety training and services. Understanding their different capabilities helps businesses to "make informed decisions about which types of guards are best suited to their operations."

Among the *machine guard types* are:

- **Fixed Guards:** Immovable barriers made of metal or sturdy plastics. Ideal for large stationary equipment like belt drives and gear systems, they allow for raw materials to be fed through machines but block operators from reaching dangerous areas.
 - *Advantages:* Can be built for a variety of applications; permanently enclose the point of operation; protect against machine repeat.
 - *Disadvantages:* Can be impractical when varying production runs use different sizes of stock or feeding methods; machine adjustments and repair often require removing the guard.
- **Adjustable Guards:** Adaptable to various sizes of equipment and production operations.
 - *Advantages:* Can be adjusted to allow different feedstock sizes.
 - *Disadvantages:* May require frequent maintenance or adjustment; operator may make guard ineffective.
- **Self-Adjusting Guards:** Barriers that move according to the size of feedstock entering the operating point. They're in place when the machine is at rest and push away when feedstock comes in.
 - *Advantages:* Often commercially available.
 - *Disadvantages:* Don't provide maximum protection; may require frequent maintenance and adjustment.
- **Interlocking Guards:** Built to halt machine operation automatically when opened; essential for heavy machinery that needs frequent maintenance or material changeovers.
 - *Advantages:* Allow access for minor servicing work permitted by **OSHA's exception to *logout/tagout regulations*** without time-consuming removal of fixed guards; should allow inching of machine.
 - *Disadvantages:* May require periodic maintenance; movable sections can't be used for manual feeding; some designs are easy to defeat; interlock control circuits may not be used for all maintenance and servicing work.
- **Electronic Guards/Presence Sensing Devices:** Commonly referred to as light curtains, these barriers use sensors to detect people in specified zones and shut down machines.
 - *Advantages:* Flexibility, ease of installation and maintenance, suitability for small spaces.
 - *Disadvantages:* Must meet an array of requirements to be used as point-of-operation safeguards; physical guards are still required at points that aren't protected electronically; don't provide protection from shards or flying debris; can be cost-prohibitive for small businesses or those with limited budgets.

The effectiveness of machine guards hinges on correct installation as well as follow-up training to ensure employees are aware of potential hazards and how guards can prevent them, HSI points out.

What types of machine guards does your business use? Tell us in the comments below.

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