

operating conditions. Since fencing and location methods can be used only when a machine can be isolated, these methods will have limited use on most production setups. Most production machines will require some kind of enclosure of the hazard points to comply with the OSHA regulations.

Types of guards

There are several types of enclosures that are suitable for guarding hazard points depending on how and where they are used.

The **fixed guard** is considered preferable to all other types and should be used in every case unless it has been definitely determined that this type is not at all practicable. The fixed guard at all times prevents access to the dangerous parts of the machine.

Fixed guards may be adjustable to accommodate different sets of tools or various kinds of work. Once adjusted, they should remain "fixed," and there should be no movement nor detachment of them.

Some fixed guards are installed at a distance from the danger point in association with remote feeding arrangements which make it unnecessary for the operator to approach the danger point.

A table of the safe distance of a guard from the danger point and the permissible size of openings in a fixed guard is given in the Point-of-Operation Guards section of this chapter.

Examples of fixed guards are found on power presses, sheet leveling or flattening machines, milling machines, gear trains, drilling machines, and guillotine cutters.

Interlocking guards. If a fixed guard cannot be used, an interlocking guard should be fitted onto the machine as the first alternative. Interlocking guards may be mechanical, electrical, pneumatic, or a combination of types.

The interlocking guard prevents operation of the control that sets the machine in motion until the guard is moved into position so that the operator cannot reach the point of operation or the point of danger.

When the guard is open, permitting access to dangerous parts, the starting mechanism is locked, and a locking pin or other safety device prevents the main shaft from turning or other basic mechanisms from operating.

When the machine is in motion, the guard cannot be opened. It can be opened only when the machine has come to rest or has reached a fixed position in its travel.

An effective interlocking guard must satisfy three requirements, it must

- 1 Guard the dangerous part before the machine can be operated
- 2 Stay closed until the dangerous part is at rest
- 3 Prevent operation of the machine if the interlocking device fails

Where neither a fixed guard nor an interlocking guard is practicable, mechanical interlocks may be used.

Automatic guards. An automatic guard may be used, subject to limitations outlined in Table 29-A, where neither a fixed guard nor an interlocking guard is practicable. Such a guard must prevent the operator from coming in contact with the dangerous part of the machine while it is in motion, or must be able to stop the machine in case of danger. (Table 29-A is on the next three pages.)

An automatic guard functions independently of the operator, and its action is repeated as long as the machine is in motion.

An automatic guard is usually operated by the machine itself through a system of linkage or levers.

Whenever an automatic guard is used on a machine which is loaded and unloaded by hand, the operator always should use hand tools.

All of the foregoing types of guard are suitable for guarding points of operation, but only the fixed guard can be used for guarding power transmission components (unless they are guarded by fencing or location as previously noted).

Safeguarding devices can be used in lieu of or in conjunction with barrier guards at the point of operation. Presence-sensing devices (either radio or electronic beam), pullbacks, restraints, and two-hand trips may be used under specified conditions and constraints. (See Chapter 32, "Cold Forming of Metals," for a fuller discussion of these devices.)

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