Types of guards

To eliminate the dangers involved in machine operation, either guards may be built and installed over the hazardous areas or the equipment may be redesigned to have no exposed dangerous parts

The modern lathe is a good example of machinery made safe through improved design Its motor drive and gear box are enclosed so that line shafts, pulleys, and belts are dispensed with The modern power press, in which all the working parts with the exception of the slide are enclosed, is another good example

Types of guards which are used to make machinery safe include the fixed guard, the interlocking guard, and the automatic guard These may be added after a machine is installed, or purchased built-in by the manufacturer

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 "Designing 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 (See Fig 24-5)

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 24-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

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 through levers, and there are many variations, such as a swing guard, a sweep guard, or a pull-back guard

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

Built-in guards Because of the lack of application of advanced standards and techniques, injuries from operation of unguarded or improperly guarded machinery continue to be a major consideration

(Text continues on page 668)