Machine Guarding Overview

Any machine part, function, or process, which may cause injury to the employee, must be safeguarded. Where the operation of a machine can injure the operator or other employees in the vicinity, the hazard must be either eliminated or controlled. Mechanical motions and actions are basic to nearly all machines, recognizing them is the first step towards protecting employees from the hazards they present. "Guard" means a barrier that prevents entry of the operator's hands or fingers into the point of operation.

Machine guarding is covered in the **Occupational Safety and Health Regulations for general industry 29 CFR 1910 Subpart O-Machinery and Machine guarding section .211 through .219** covers various machines and applications. Some standards specific in nature, others covering general requirements.

Guards can be constructed out of wood, metal or plastic – its construction should be able to withstand the working environment. In a light manufacturing operation, a simple plastic guard on a machine may be sufficient. In a metal forging or foundry operation, strong metal or steel guards would be necessary to withstand wear and tear of operations and surrounding equipment. Guards should be secured in a fashion in which they are not readily removable. Bolts, screws or other means should be utilized verse wing nuts or some other form of quick release fastener.

The size of guard openings relates to what they are trying to protect. Typically, openings are necessary for insertion of parts or material, or for machine lubrication and adjustment. There are two areas that typically require guarding: pinch point hazards and point of operation hazards.

Pinch point hazards
A "pinch point" means any point other than the point of operation at which it is possible for a part of the body to be caught between the moving parts of a machine or auxiliary equipment. These generally require some form of a cover or barrier to protect the pinch point hazard. See figure 1.

Figure 1
Cover for pinch point hazard

Point of operation hazard
A point of operation hazard is defined as the area of the machine where material is positioned and work is being performed during any process such as shearing, punching, forming, or assembling. These guards typically have openings for the insertion of parts into the machine. The closer the guard is to the point of operation hazard, the smaller the opening needs to be.

Guard openings should meet the requirements of the following table which will help to ensure openings in guards will not allow access to the point of operation hazard.

Distance of the opening from point of operation hazard (inches)	Maximum width of opening (inches)
1/2 to 1 ½	1/4
1 ½ to 2 ½	3/8
2 ½ to 3 ½	1/2
3 ½ to 5 ½	5/8
5 ½ to 6 ½	3/4
6 ½ to 7 ½	7/8
7 ½ to 12 ½	1 ¼
12 ½ to 15 ½	1 ½
15 ½ to 17 ½	1 7/8
17 ½ to 31 ½	2 1/8
Over 31 ½	6

Figure 2 illustrates an adjustable guard, which can conform to the size and shape of the part being inserted and offers appropriate safe distance protection.

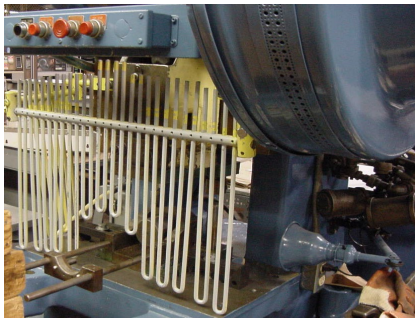
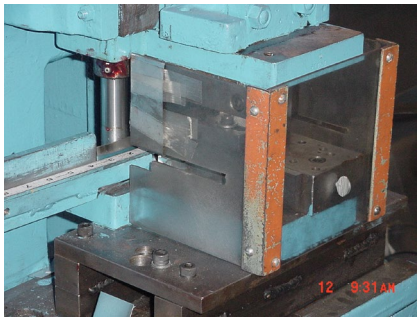


Figure 2
Shows inadequate adjustable channel guards to protect point of operation hazard

Figure 3 represents the distance measurement from the guard opening to the point of operation hazard for a mechanical power press. This corresponding distance measurement when applied to Table O (29 CFR 1910.217(f)(4)) will determine the maximum size opening of the guard at that distance. Increasing the distance from the point of operation hazard will allow the guard opening to increase. Also consider the size of the part or material being inserted into the opening.



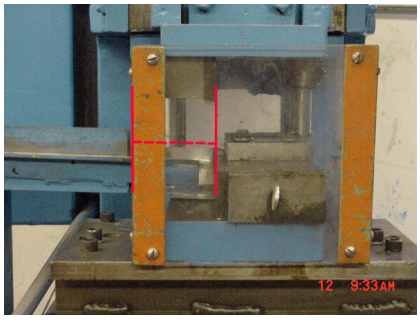


Figure 3
Distance measurement from guard opening to point of operation hazard

Following these simple principles will help to ensure machinery and equipment is safe to operate and employees are properly protected.