



Loss Control Insight

Basics of Machine Safeguarding

When the operation of a machine, or accidental contact with it, can injure the operator or others in the vicinity, the hazards must be either controlled or eliminated. Dangerous moving parts in three basic areas require safeguarding:

- The point of operation: that point where work is performed on the material, such as cutting, shaping, boring, or forming of stock.
- Power transmission apparatus: all components of the system which transmit energy to the part of the machine performing the work, such as flywheels, pulleys, belts, and gears.
- Other moving parts: all parts of the machine which move while the machine is working. These can include reciprocating, rotating, and transverse moving parts, as well as feed mechanisms and auxiliary parts of the machine.

Hazardous Motions

Rotating motion: even smooth, slowly rotating shafts can grip clothing, or force an arm or hand into a dangerous position. Rotating mechanisms include cams, flywheels, shaft ends, and meshing gears. The danger increases when projections such as set screws, bolts, abrasions, and projecting keys are exposed on rotating parts.

In-running nip point hazards are caused by the rotating parts on machinery. There are three main types of in-running nips:

- Parts rotate in opposite directions. These parts may be in contact or in close proximity. In the latter case, the stock fed between the rolls produces the nip points.
- Nip points created between rotating and tangentially moving parts. An examples would be the point of contact between a power transmission belt and its pulley.
- Nip points created between rotating and fixed parts which create a shearing, crushing, or abrading action. An examples would be the edge of an abrasive wheel and an incorrectly adjusted work rest.

Reciprocating motions may be hazardous because a worker may be struck by or caught between a moving and a stationary part.

Transverse motion (movement in a straight, continuous line) creates a hazard because a worker may be struck or caught in a pinch or shear point by the moving part.

Requirements for Safeguards

Safeguards must meet these minimum general requirements:

- Prevent contact: The safeguard must prevent hands, arms, and any other part of a worker's body from making contact with dangerous moving parts. A good safeguarding system eliminates the possibility of workers placing parts of their bodies near hazardous moving parts.
- Secure: Workers should not be able to easily remove or tamper with the safeguard. Guards and safety devices should be made of durable material that will withstand the conditions of normal use. They must be firmly secured to the machine.

- Protect from falling objects: The safeguard should ensure that no objects can fall into moving parts. A small tool dropped into a cycling machine could easily become a projectile that could strike and injure someone.
- Create no new hazards: A safeguard should not create a shear point, jagged edge, or unfinished surface which can cause a laceration. For example, the edges of guards should be rolled or bolted to eliminate sharp edges.
- Create no interference: Any safeguard which impedes a worker from performing the job quickly and comfortably might soon be overridden or disregarded. Proper safeguarding can actually enhance efficiency since it can relieve the worker's apprehensions about injury.
- Allow safe lubrication: If possible, workers should be able to lubricate the machine without removing the safeguards. Locating oil reservoirs outside the guard, with a line leading to the lubrication point, will reduce the need for a worker to enter the hazardous area.

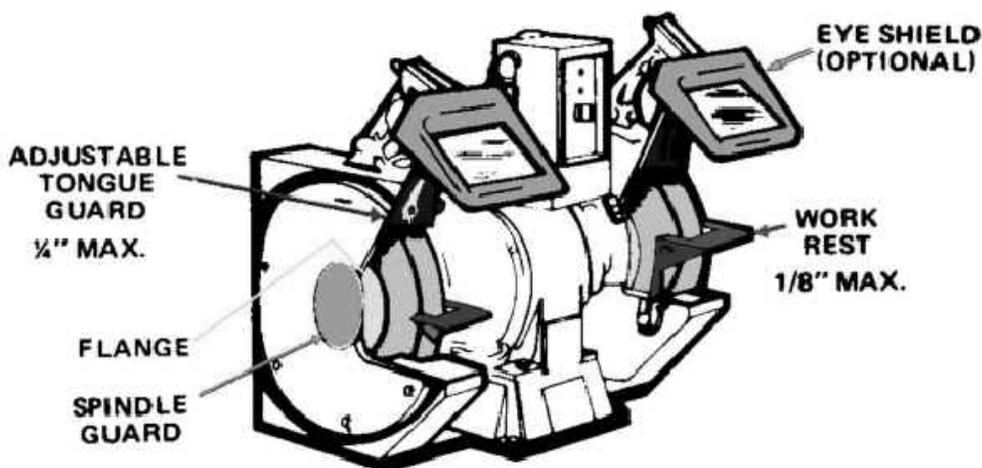
Training

Even the most elaborate safeguarding system cannot offer effective protection unless the worker knows how to use it and why. Thorough operator training should involve instruction or hands-on training in the following:

1. a description and identification of the hazards associated with particular machines;
2. the safeguards, how they provide protection, and the hazards they guard against;
3. how to use the safeguards and why;
4. how and under what circumstances safeguards can be removed, and by whom (in most cases, repair or maintenance personnel only); and
5. what to do if a safeguard is damaged, missing, or unable to provide adequate protection.

This kind of safety training is necessary for new operators and maintenance or setup personnel, when any new or altered safeguards are put in service, or when workers are assigned to a new machine or operation.

As an example take a look at your grinder ... does your grinder pass this test?



Machine Guarding Checklist

This checklist is a useful tool in the evaluation of your machine guarding practices.

- Do the safeguards prevent workers' hands, arms, and other body parts from making contact with dangerous moving parts?
- Are the safeguards firmly secured and not easily removable?
- Do the safeguards ensure that no object will fall into the moving parts?
- Do the safeguards permit safe, comfortable, and relatively easy operation of the machine?
- Can the machine be oiled without removing the safeguard?
- Is there a system for shutting down the machinery before safeguards are removed?
- Can the existing safeguards be improved?
- Is there a point-of-operation safeguard provided for the machine? Does it keep the operator's hands, fingers, body out of the danger area?
- Is there evidence that the safeguards have been tampered with or removed?
- Could you suggest a more practical, effective safeguard?
- Could changes be made on the machine to eliminate the point-of-operation hazard entirely?
- Are there any unguarded gears, sprockets, pulleys, or flywheels on the apparatus?
- Are there any exposed belts or chain drives?
- Are there any exposed set screws, key ways, collars, etc.?
- Are starting and stopping controls within easy reach of the operator?
- If there is more than one operator, are separate controls provided?
- Are safeguards provided for all hazardous moving parts of the machine including auxiliary parts?
- Do operators and maintenance workers have the necessary training in how to use the safeguards and why?

- Have operators and maintenance workers been trained in where the safeguards are located, how they provide protection, and what hazards they protect against?
- Have operators and maintenance workers been trained in how and under what circumstances guards can be removed?
- Have workers been trained in the procedures to follow if they notice guards that are damaged, missing, or inadequate?
- Is the operator dressed safely for the job i.e., no loose-fitting clothing or jewelry)?