Machine Guarding Safety Program

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Purpose

This program is to establish requirements for the safety of Texas A&M – Texarkana employees while working in close proximity for machinery with hazardous moving parts. The purpose of machine guarding is to protect the machine operator and other employees in the work area from hazards created by ingoing nip points, rotating parts, flying chips, and sparks. There are as many hazards created by moving parts as there are types of machines. Safeguards are essential for protecting workers from needless injuries.

Scope

Any machine part, function, or process which may cause an injury must be safeguarded. Hazards must be eliminated or controlled when there is the potential for the operations of a machine or accidental contact with it that can injure the operator or other employees working on, near, or around the machine.

Responsibilities

Environmental Health & Safety (EHS)

EHS is responsible for reviewing hazards associated with machine safeguarding during annual laboratory inspections. The machine safeguarding will be reviewed to make sure they are installed on machines that they are needed, in good working order, suitable of the jobs they are used for, and do not pose a hazard to the operator. EHS is responsible for reviewing and updating the Machine Guarding Program. EHS and laboratory coordinators also work jointly in the development of Job Safety Analysis for machine safeguarding that present a unique hazard to the employee.

Supervisors, Laboratory Personnel, and Employees

All personnel who operate machines that are equipped with machine safeguarding equipment are required to have training before operating machinery. An excellent means of conducting this training is to develop a JSA that covers the pertinent information how to properly and safely use these types of tolls and equipment with machine safeguards.

**If maintenance is being performed on a piece of equipment that requires the removal of the machine safeguard, the person performing the maintenance is responsible to secure the machines safeguard back in place before turning the machine back on.

General

One or more methods of machine guarding shall be provided to protect the operator and other employees in the machine area from hazards such as those created by point of operation, ingoing nip points, rotating parts, flying objects/chips/metal, and sparks.

A wide variety of mechanical motions and actions may present hazards to the employee. These can include the movement of rotating members, reciprocating arms, moving belts, meshing gears, cutting teeth, and any part that may impact or shear. These different types of hazardous mechanical motions and actions are basic to nearly all machines, and recognizing them is the first step toward protecting employees from the dangers they present

Point of Operation

The point of operation is the point on the machine where work is being performed on materials, such as cutting, shaping, drilling, boring, and/or forming of stock.

- Point of operation guards shall be in conformity with all appropriate standards.
- If specific standards are not available, the machine shall be designed and constructed to prevent the operator from having any part of their body in the danger zone during the operating cycle.
- Examples of Machines that Require Point of Operation Guarding: Portable power tools, powered saws, jointers, drill presses, guillotine cutters, power presses, shears, etc.
- Barrels, Containers, and Drums: Revolving drums, barrels, and containers shall be guarded by an enclosure which is interlocked with the drive mechanism, so that the barrel, drum, or container cannot revolve unless the guard enclosure is in place (i.e., cement/mortar mixer)

Fan Blade Exposure

When the periphery of the blades of a fan is less than seven (7) feet above the floor or working level, the blades are required to be guarded. The guard shall have openings no larger than one-half (1/2) inch (i.e. – Exhaust fans, window fans, portable fans, wall-mounted fans, industrial strength fans, etc.).

Anchoring Fixed Machinery

Machines designed for a fixed location shall be securely anchored to prevent the machine from walking or moving from its designated location when it is in use.

Operational Controls

These are also called ‘Other Moving Parts’ which refers to 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.

Awareness of Motions and Actions

Rotating shafts can grip hair and clothing. Through minor contact rotating shafts can force the hand, arm, or any other body part into a dangerous position. The danger increases when projections such as set screws, bolts, nicks, abrasions, and projecting keys or set screws are exposed on rotating parts. Collars, couplings, cams, clutches, flywheels, shaft ends, spindles, meshing gears, and horizontal or vertical shafting are some examples of common rotating mechanisms which may be hazardous.

Cutting Action

This type of action may involve rotating, reciprocating, or transverse motion. The danger of cutting action exists at the point of operation where finger, arm, and body injuries can occur, and where flying chips or scrap material can strike the head, face, and eyes. These hazards are present at the point of operation when cutting wood, metal, or other materials. Several examples of mechanisms involving cutting hazards include bandsaws, circular saws, boring and drilling machines, turning machines (lathes), or milling machine.

Punching Action

This results when power is applied to a slide (ram) for the purpose of blanking, drawing, or stamping metal or other types of materials. The danger of this type of action occurs at the point of operation where stock is inserted, held, and withdrawn by hand. Examples of machines used for punching operations are power presses and iron workers.

Shearing Action

This action involves applying power to a slide or knife in order to trim or shear metal or other types of materials. A hazard occurs at the point of operation where stock is actually inserted, held, and withdrawn. Examples of machines used for shearing operations are mechanically, hydraulically, or pneumatically powered shears.

Bending Action

This occurs when power is applied to a slide in order to draw, turn, or stamp metal or other materials into a specified shape. A hazard occurs at the point of operation where stock is inserted, held, and withdrawn. Equipment that uses bending action includes power presses, press brakes, and hydraulic tube benders.

Proper Measures When Implementing Safeguards

All safeguards must meet the following requirements:

Prevent Contact

The safeguard must prevent hands, feet, arms, legs, or any other part of the body from making contact with dangerous moving parts. A good safeguard system eliminates the possibility of the operator or another employee placing his hands near hazardous moving parts. The best practice is to interlock machine control and guards so the machine is inoperable unless the guards are in place.

Be Secured to the Machine

Personnel should not be able to remove or tamper with the safeguard, since a safeguard that can easily be made ineffective is not a safeguard at all. 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 guard should ensure that no objects can fall into moving parts. Example: A small tool which dropped into a machine that is spinning in a cyclical motion could cause the object to easily become a projectile that could strike someone.

Does NOT Create a New Hazard

A safeguard defeats its own purpose if it creates a hazard of its own, such as a shear point, a jagged edge, or an unfinished surface which can cause lacerations. The edges of guards should be rolled or bolted in such a way that they eliminate sharp edges.

Does NOT Create Interference

Any safeguard which impedes the employee from performing the job quickly and comfortably may be used improperly to make the job easier or even discarded while the work is being conducted. Proper safeguarding can actually enhance efficiency by relieving the stresses placed on the employee of thinking about the possibility of an injury when using an unguarded or improperly guarded piece of equipment.

Allows for Safe Lubrication

If possible, the employee should be able to lubricate or service the machine with the safeguard in place. Locating oil reservoirs outside the guards with lines leading to the lubrication points will reduce the need for the operator or maintenance employee to enter the hazardous area.

Other Recommended Aides

An awareness barrier serves as a reminder to a person that he or she is approaching the danger area. Even though the barrier does not physically prevent an employee from entering the danger area, it calls their attention to it. For an employee to enter the danger area, an overt act must take place, that is, the employee must either reach or step over, under or through the barrier.

An example of an awareness barrier would be a highly visible tape placed on a table saw a few inches away from the point of operation.

**Awareness barriers are not considered an adequate means of prevention when continual exposure to the hazard exists.

Special hand tools for placing and removing material can be used to permit easy handling of material without the operator placing a hand in the danger zone (i.e. – Push stick, push block, etc.). However, these types of tools shall not be used in the place of other required guards, but can only be used to supplement protection provided.

Guard Construction

Most manufacturers of today's machinery provide point of operation and power transmission safeguards, but not all machines that are used in the various shops at the University have built in safeguards by the manufacturer. Always check with the manufacturer of the machine to see if they also produce safeguards for that particular machine. Guards designed and installed by the builder/manufacture offer two main advantages:

- They usually conform to the design and function of the machine.
- They can be designed to strengthen the machine in some way or to serve some additional functional purposes.

However, user-built guards are sometimes necessary since guards may not be produced for a specific piece of machinery or because the machinery may pre-date safeguard use.

Machine Guarding

Machine guards lower the risk of contact between the operator and the machine. Safeguards put in place must prevent contact with hazards, be secure, protect from falling objects, create no new hazards, create no interference, and allow for the safe lubrication of parts.

The four types of machine safeguards are:

- Fixed – guards that a permanently attached to the machine or tool, don't have any moving parts, and can't be moved while the machine is in use.
- Adjustable Guards – guards that are permanent, but can be adjusted to allow the machine to handle different sizes of material. They must be manually adjustable and locked into place.
- Self-Adjusting Guards – same purpose as the adjusting guards but automatically adapt to the size of the material.
- Interlocking Guards – guards that automatically shut off or disengage the power source when the guard is open or removed.

Machinery Maintenance & Repair

Having superior maintenance and repair procedures (i.e. – Job Safety Analysis, Standard Operating Procedures) in place to reduce hazards can contribute significantly to the safety of university maintenance personnel and machine operators. The following 4 things can make safe maintenance and repair work difficult:

- The variety and complexity of machines to be serviced
- The hazards associated with their power sources
- The special dangers that may be present during machine breakdown
- The severe time constraints often placed on maintenance personnel

If possible, machine design should permit routine lubrication and adjustment WITHOUT removal of safeguards. The Lockout/Tagout procedure must be adhered to when safeguards must be removed in order to work on mechanical parts or have the machine serviced. Example: If it is necessary to oil machine parts while the machine is running, special safeguarding equipment may be needed solely to protect the oiler from exposure to hazardous moving parts.

Preventing Hazards While Servicing Machines

The maintenance and repair crew must never fail to replace the guards before the job is considered finished and the machine released from Lockout/Tagout. The following safeguarding measures should be taken in order to prevent hazards while servicing machines:

- Notify all affected employees (usually machine or equipment operators or users) that the machine or equipment must be shut down to service the machine or perform maintenance
- Stop the machine
- Isolate the machine or piece of equipment from its energy source

- Lockout/Tagout the energy source
- Relieve any stored or residual energy
- Verify that the machine or equipment is isolated from the energy source

The following list is exceptions to the above general rules in regards to safeguarding measures that should be taken in order to prevent hazards:

- When the servicing or maintenance is not hazardous for an employee
- When the servicing which is conducted is minor in nature
- Done as an integral part of production
- The employer utilizes alternative safeguards which provide effective protection as required by 29 CFR 1910.212 or other specific standards

Return the Machine or Piece of Equipment to Service

When the servicing or maintenance is completed, there are specific steps which must be taken to return the machine or piece of equipment to service. These steps include:

- Inspection of the machine or equipment to ensure that all guards and other safety devices are in place and functional
- Checking the area to ensure that energization and startup of the machine or equipment will not endanger employees
- Removal of the lockout devices
- Re-energization of the machine or equipment, and
- Notification of affected employees that the machine or equipment may be returned to service

Training

Even the most elaborate safeguarding system cannot offer effective protection unless the employee knows how to use it and why. Specific and detailed training is therefore a crucial part in any effort to provide machine safeguarding against machine-related hazards. Thorough employee training should include instructions or hands-on training for the following items:

- Description and identification of the hazard(s) associated with the machine
- The safeguards themselves, how they provide protection, and the hazard(s) for which they are intended to guard
- How and under what circumstances safeguards can be removed, and who may remove them. (i.e. – Maintenance personnel ONLY, a qualified employee in the

shop, etc.) Also, employees should also be trained in the precautions to take while the system is unguarded (i.e. – Lockout/Tagout, de-energized equipment, etc.)

- Maintenance personnel must be trained in knowing which machines can be serviced while running and which ones need to de-energized (lockout/tagout)
- Employees need to also be trained in the scenarios of what to do if a guard is damaged, missing, or unable to provide adequate protection. (i.e. – Contact the supervisor, place a work order, contact EHS if a guard has never been in place and the employee/supervisor is unsure if one needs to be in place, etc.)
- Supervisors or the designated employee in charge of administering Machine Guard training must turn in a copy of all training documents and roster sheets to the Department of Environment, Health, and Safety for recordkeeping