

Machine Guarding

Machine Guards are designed to protect you from the hazards of moving machinery parts.

Basics of Machine Safeguarding

Crushed hands and arms, severed fingers, blindness -- the list of possible machinery-related injuries is as long as it is horrifying. There seem to be as many hazards created by moving machine parts as there are types of machines. Safeguards are essential for protecting workers from needless and preventable injuries.

A good rule to remember is: Any machine part, function, or process which may cause injury must be safeguarded. 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.



Correct Guarding



Possible Death



No Guard

The absence or incorrect use of machine and tools guards can cause injury or death. Without proper guarding, loose clothing or hair can get caught by rotating or reciprocating mechanisms.

Fingers and hands can get caught in rollers, gears, pulleys, belts and in chain drives. Coworkers working near moving machine parts are at risk of getting cut, sheared, or crushed

This training handout will describe common hazards associated with moving machinery parts and the requirements and safeguards that should be used to minimize your risk of injury

This training will illustrate scenarios so that you will be able to:

- Identify the mechanical hazards common to all machines
- Recognize the types of guards used to control machine hazards
- Recognize different types of safety devices used to control machine hazards
- Describe other safeguards that may be used to minimize your risk of machine-related injury

- Identify types of personal protective equipment that you may use while operating industrial machinery.

Regulatory Background

Any machine part, function, or process which may cause injury must be safeguarded. When the operation of a machine or accidental contact with can injure the operator or others in the vicinity, the hazards must either be controlled or eliminated. Workers who operate and machine machines suffer approximately 18,000 injuries which include amputations, lacerations, crushing injuries and abrasions, and 800 deaths per year. OSHA requires that machine guarding be provided and maintained in a manner sufficient to protect machine operators and other persons present in machine areas. The Occupational Safety and Health administration (OSHA) requirements can be found at www.OSHA.gov in the Code of Regulations CFR 1910 Subparts O & P. The standard outlines definitions, general requirements, and standards for safeguarding different types of industry machinery.

Some states also have State Approved OSHA Programs and have adopted their own state specific standards and enforcement for machine guarding. You can find out if your state has their own OSHA Program by going to <http://www.osha.gov/> and selecting State Programs from the left menu pane.

What is a State OSHA Program?

Section 18 of the Occupational Safety and Health Act of 1970

(The Act) Encourages States to develop and operate their own job safety and health programs. OSHA approves and monitors State plans and provides up to 50 percent of an approved plan's operating costs.

There are currently 22 states and jurisdictions operating complete state plans (covering both the private sector and state and local government employees) and 4 - Connecticut, New Jersey, New York and the Virgin Islands - which cover public employees only. (Eight other States were approved at one time but subsequently withdrew their programs).The following are states with OSHA Programs:

Alaska, Arizona, California, Connecticut, Hawaii, **Indiana**, Iowa, Kentucky, Maryland, **Michigan**, Minnesota, Nevada, New Mexico, New Jersey, New York, North Carolina, Oregon, Puerto Rico, South Carolina, Tennessee, Utah, Vermont, Virgin Islands, Virginia, Washington and Wyoming.



Machine Guarding - Must be visible and stated

Machine Guarding Standards

Machine guarding hazards are addressed in specific standards for the general industry, marine terminals, longshoring, and the construction and agriculture industries. This page highlights OSHA standards, Federal Registers (rules, proposed rules, and notices), directives (instructions for compliance officers), standard interpretations (official letters of interpretation of the standards), and national consensus standards related to machine guarding.

Training Requirements

Training is a critical part of any effort to protect against machine-related hazards. Your supervisor is responsible for providing you training when any new safeguards are put into service or when anyone is assigned to a new machine or operation.

At a minimum, your training should cover the following topics:

- A description and identification of the hazards associated with the machine
- A description of the safeguards and their functions
- Instruction on how to use the safeguards
- Instruction on how, and under what circumstances safeguards may be removed, and by whom
- Instruction on what to do if a safeguard is missing, damaged, or inadequate.



Mechanical Hazards



All machines have three (3) fundamental hazards:

- Point of operation, the area of a machine where the work is being performed
- Power transmission apparatuses, all components of the mechanical system that conduct energy to the part of the machine tool doing the work including flywheels, pulleys, belts, chains, couplings, spindles, cams, gears, connecting rods and any other machine components that transmit energy.
- Other moving parts such as machine components that move during the machine operation that are reciprocating, rotating, and transverse moving parts, and auxiliary machine parts

Despite machines having the same basic characteristics, their safeguarding need vary widely due to their differences in design and operator involvement.



Mechanical Motions and Actions

There are many mechanical motions and actions that can be hazardous. Recognizing these hazards, alone or in combinations, is the first step in protecting yourself

Basic types of hazardous mechanical motions and actions:

Motions included are:

- Rotating (including in-running nip or pinch points)
- Reciprocating
- Transversing motions

Actions included are:

- Cutting
- Punching
- Shearing
- Bending

All mechanical motion is potentially dangerous and hazardous

Nip Points - One of the most hazardous is in-running nip points or "pinch points" which occurs when two parts move together and at least one moves in a rotary or circular motion that gears, rollers, belt drives and pulleys generate. Nip points are also created between rotating and tangentially moving parts. Some examples would be: the point of contact between a power transmission belt and its pulley, a chain and a sprocket, and a rack and pinion.

Rotating - Circular movement of couplings, cams, clutches, flywheels, and spindles as well as shaft ends and rotating collars that may catch your clothing or otherwise force a body part into a dangerous location. Rotating motion can be dangerous; even smooth, slowly rotating shafts can grip clothing, and through mere skin contact force an arm or hand into a dangerous position. Injuries due to contact with rotating parts can be severe. 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. The danger increases when projections such as set screws, bolts, nicks, abrasions, and projecting keys or set screws are exposed on rotating parts

Reciprocating is a back and forth or up and down action that may strike or entrap you between a moving part and a fixed object. Reciprocating motions may be hazardous because, during the back-and-forth or up-and-down motion, a worker may be struck by or caught between a moving and a stationary part.

Transversing is movement in a straight, continuous line that may strike or catch you in a pinch or shear point created between the moving part and a fixed object. Moving belt conveyor type machines are a very common type of Transversing motion.

Cutting is action generated during sawing, boring, drilling, milling, slicing and slitting. Cutting 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, particularly in the area of the eyes or face. Such hazards are present at the point of operation in cutting wood, metal, or other materials. Examples of mechanisms involving cutting hazards include bandsaws, circular saws, boring or drilling machines, turning machines (lathes), or milling machines.

Punching action results when power is applied to a slide (ram) for the purpose of blanking, drawing, or stamping metal or other materials. The danger of this type of action occurs at the point of operation where stock is inserted, held, and withdrawn by hand.

Shearing action involves applying power to a slide or knife in order to trim or shear metal or other 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 occurs when power is applied to a slide to draw or form metal or other materials into various shapes. Bending action results when power is applied to a slide in order to draw or stamp metal or other materials. 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 tubing benders.



You should also be aware of non mechanical hazards such as:

Power sources - Electrical and Hydraulic

All power sources for machines are potential sources of danger. When using electrically powered or controlled machinery, the equipment as well as the electrical system itself must be properly grounded. Replacing frayed, exposed, or old wiring will also help protect you and others from electrical shock or electrocution. High pressure systems also need to be carefully inspected and put on a systematic maintenance schedule to prevent possible failure from pulsation, vibration, or leaks. Such a failure could cause explosions, flying objects and a variety of other things.

Unwanted Exposure to Sound and Noise

Machinery produces unwanted sound or noise which can result in a variety of hazards to you and others in close proximity. Research has linked noise to a wide range of harmful health effects, from hearing loss and aural pain to nausea, fatigue, reduced muscle control, and emotional disturbance. Engineering controls such as the use of sound

dampening materials, and hearing protection, can help control the harmful effects of noise. Administration controls such as temporarily removing the operator from the noise source can also be effective.

Effects of sound and noise exposure - please note that when the daily noise exposure is composed of two or more periods of noise exposure of different levels, their combined effect should be considered as opposed to each singularly.

Cutting Fluids, Coolants, and Other Potentially Harmful Substances

Because some machines require the use of cutting fluids, coolants, and other potentially harmful substances, operators, maintenance personnel, and others in the immediate area may need additional protection. These substances can cause ailments ranging from dermatitis to serious illnesses and diseases. Specially constructed safeguards, ventilation, and personal protective equipment and clothing are possible temporary solutions to the problem of machine tool related chemical hazards, but only until these hazards can be better controlled or eliminated from the workplace.



Requirements and Safeguards

At a minimum, safeguards must meet these following general requirements:

Prevent contact - Safeguards must minimize the possibility of you or your coworkers placing your hands into hazardous moving parts

Remain secure - You should not be able to easily remove or tamper with the safeguard

Protect from falling objects - Safeguards should ensure that no objects can fall into moving parts

Create NO new hazards - A Safeguard defeats its purpose if it creates a hazard of its own

Create no interference - A safeguard should not create an unacceptable obstruction

Allow safe maintenance and lubrication - It should be possible to lubricate the machine without removing the safe guard

OSHA Fatal Fact: In July of 1999, a worker using a hydraulic press to punch holes in a piece of steel was fatally injured when a piece of steel debris struck him in the neck. When the hydraulic press attempted to punch through the hardened steel plate, the punch bit shattered. According to an OSHA investigator, the guard on the machine had been removed sometime prior to the accident and had not been replaced.

Machine Safeguards can be grouped under (5) five general classifications:

1. Guards
2. Safety devices
3. Location and distance safeguards
4. Potential feeding and ejection methods
5. Miscellaneous aids

Guards

Guards are barriers that prevent access to danger areas. There are 4 general types of guards that all workers should recognize.



Fixed Guards are a permanent part of the machine. It is not dependent upon moving parts to perform its intended function. This guard is usually preferable to other types.



Interlocked Guards

When this type of guard is opened or removed, the sensor or trip mechanism automatically shuts off the power or disables the machine from operating. The machine will not start until the guard is in its proper place and position.



Adjustable Guards

Adjustable guards are useful because they allow flexibility for different size and shape applications of parts or units. Many machines perform the same type of function on different types of size material. Being able to adjust the guard allows for the machine to perform the function on varied sized of material by moving the guard to fit the material size.



Self Adjusting Guards



Sensors determine the size of the source material enabling the size of the guard openings to adjust the machine guards to the size of the material being moved through the machine.



Guard Construction and Implementation

Guards should be designed and installed by the manufacturer or design engineers of the machine. By following this rule you will have two main advantages:

- The guard will comply with the integrity, design and function of the machine
- The guard can be designed to add stability and strength to the machine and possibly provide an additional purpose. NEVER alter the machine itself.

Sometimes it is necessary to fabricate guards or contract a fabricator to construct a guard for the application needed

The plus side of user built or contracted built guards:

- With older machinery the manufacturer may no longer be in business and the replacement parts and additional engineering may no longer be available. Therefore fabricating a guard may be the only choice especially in power plants where machinery is not powered by individual motor assemblies.
- It is always best to contract skilled personnel to design and fabricate the guards who are familiar with the operation of the machine and the safeguards needed
- The guards can be designed and built to for unique situations and tailored for application changes.

The down side of user built or contracted built guards:

- The design may not be totally compatible to the design, integrity and function of the machine.
- The design and construction may not conform to the strength and rigidity required for the application. OSHA standards require extensive testing before safety Guards are approved for distribution.
- ANY machine part, function or process which may cause injury must be safeguarded.
- When the operation or use of any machine or accidental contact with it can cause injuries to you or others in the vicinity, hazards must be controlled OR eliminated.
- If a machine has been designed with a guard in place, DO NOT alter it, tamper with it or remove it.



Safety Devices

Safety devices help prevent contact with points of operation and can replace or supplement guards if they are recommended or endorsed by the machine manufacturer.

Depending on the type of safety device:

- It may stop the machine if a worker's hand or any part of the body is accidentally placed in a dangerous area.
- There are restraints that attach to workers to keep them from being able to extend into dangerous areas during machine operation.
- There are safety devices that require the worker to use 2 hands on machine controls for machine operation. This also eliminates either hand from accidentally being in a danger area or the machine.
- Safety devices can be designed to provide a barrier which is synchronized with the operating cycle of the machine which will prevent human entry into the danger area during the hazardous part of the machine cycle.

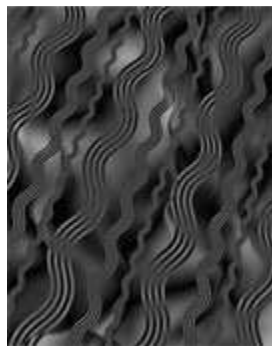


Various types of presence sensing devices can be used to safeguard many different kinds of machines as per OSHA 29 CFR 1910.212 and 1910.217.

Presence-Sensing devices use a system of light sources and controls that can interrupt the machine's operating cycle. If or when the light field is broken, the machine stops and will not continue operation. These devices are widely used on robots, power presses, textile manufacturing equipment and many other industrial machines. Presence sensing devices provide maximum visibility of a machine's danger zone. These types of devices are to be used only on machines which can be stopped before the operator can reach the danger area.



Radio Frequency devices use a radio beam that is a part of the machine control circuit. the operating principal is similar to presence-sensing devices. However, accident records and safety analyses of radiofrequency presence sensing devices show that improper application, use, selection, design or mounting of these devices can result in serious accidents. It is recommended that radiofrequency presence sensing devices not be used as the primary safeguards or only safeguards for workers exposed to serious hazards. The basic function of a radiofrequency presence sensing device is to interrupt a machine's operating cycle when an object is detected within the device's sensing field. For the device to be effective, it must:



Radio Frequency Identification
electric conceptual compositions

1. be installed and tuned so that effective sensing occurs at least at a minimum safe distance;
2. be able to detect penetration of a minimum hand size;
3. stop or prevent the operation of a machine as long as any part of an employee's body is within the machine's danger zone;
4. be interlocked with other guarding devices or have fixed guards to prevent human access to a machine's danger zone except through the sensing field;
5. protect exposed employees during all phases of machine operation including start-up, shutdown, and maintenance; and
6. generate no false "safe-to-operate" signals and ignore received false "safe-to-operate" signals due to component malfunction or environmental conditions such as unexpected electrical or magnetic fields, humidity, and moisture.

A radiofrequency presence sensing device may not be able to provide effective protection if:

1. it is not installed and tuned so that its sensing field is at a safe distance;
2. penetrating object is too small to be detected in time by the sensing field;
3. a penetrating object is between the field and the danger zone;
4. its source of power fails while the machine remains operative;
5. it is installed on equipment not designed to stop upon field interruption at any point of the machine's operating cycle, such as full revolution presses.

Capacitance Proximity Sensing (CPS)

CPS devices (*radiofrequency presence sensing devices*) consist of a control unit, a coupler, a sensor antenna and a cable connecting the control unit to the sensor. The antenna should have a geometrical shape that makes the generated sensing field form an envelope around the space where human detection is desired. This sensor antenna is made of electrical conducting material and is isolated from the ground. An oscillating electrical signal in the radiofrequency range of 150 - 400 KHz is generated in the control unit and sent through the cable and coupler to the sensor. At the sensor antenna the signal creates an electric potential and generates an electromagnetic field. The developed field can be much larger than the volume defined by the antenna. The shape of the field is affected by the location of objects within its boundaries and by shielding at the sensor, and is not normally well-defined. Physical changes in the space surrounding the antenna alter this electromagnetic field. An electronic bridge circuit incorporating an adjustable reference capacitance is used to detect changes in the field capacitance. At a tuned level the bridge

becomes unbalanced, thus triggering machine stoppage.

Studies have shown that well-grounded conductors (people) are more easily detected by CPS system because a grounded conductor causes a greater change in capacitance in a CPS detection bridge than a weakly-grounded conductor. In fact, ungrounded conductors may not be detected and poorly grounded objects must penetrate the field more deeply for CPS devices to detect the presence of such objects. Attention should be paid to potential problem situations such as those where employees can move from ground to an insulated platform while remaining in an antenna's detection space. Detectable changes of the sensing field in the presence of an operator may diminish when the operator is isolated from ground. Intermittent energizing of outside electric fields (such as those from electric motors or power supplies) and the movement of objects into the sensing field (such as maintenance gear) also should be checked to insure that they do not change the capacitance of the CPS system. Changes in machine tool or die layout may also adversely affect the detection field.

CPS devices employ a "sensitivity" control as an operating adjustment to compensate for changes in the field due to added or subtracted shielding such as tooling and support hardware. This adjustment has the effect of moving an effective sensing point toward or away from a machine's danger zone. Unfortunately, this can permit effective sensing at less than a safe distance. Also, holes in the sensing field can be created if the effective sensing point is collapsed to the antenna. In this case the system might not detect the presence of an operator's arm in the sensing field. The safety distance between the sensing plane and the danger point cannot be set upon initial installation, but must be reset for each application.

Recommendation:

Specific standards have not been adopted for the installation, adjustment, and maintenance of radiofrequency presence sensing devices. Employers using such devices should have had safety hazard analyses performed to determine potential failures or limitations of the devices in their applications. Employers should be aware that the performance of a CPS device may be affected as environmental and physical conditions are changed.

In 1979, National Institute for Occupational Safety and Health (NIOSH) issued a warning on the use of radiofrequency presence sensing devices. The warning emphasizes that the following procedures be followed:

1. Care must be taken to set a device's sensitivity for the operator's grounded condition and allow for variations in the operator's working position during a workday.
2. Supervisors and workers should avoid drastic grounding changes once sensitivity is set and a device is in use. This includes changes in what the operator is standing or seated on.

3. Manufacturer's instructions should be followed carefully in the construction and placement of radiofrequency antennas.

4. The manufacturer of a device should be consulted about specific problems, such as extreme sensitivity variations in particular machine applications.

Because of the uncertainties involved with the ability of radiofrequency detectors to measure intrusion accurately due to ground changes, field interference and other physical and environmental conditions, CPS devices should not be used as the primary or only safeguard to protect workers who are frequently exposed to a serious hazard. When used for applications involving infrequent human intervention such as perimeter guarding, CPS devices may provide adequate protection. Changes in sensing distance may not be critical if there is no need for an operator to normally reach into the danger zone. A combination of a CPS device and an automatic feeding device or other safe guarding method provides better protection.

Compliance and consultation personnel must be aware of the hazard addressed in this bulletin. Please disseminate this information to Area Offices, State Plan States and Consultation Projects. A companion information bulletin is being prepared on photoelectric type presence sensing devices and will be issued in the very near future.

Electromechanical Sensing Uses a probe or contact bar -



Electromagnet



Probe

- which descends to a presence distance when you start the machine cycle. If an obstruction prevents it from descending its full distance, the control circuit won't allow the machine to start.

Pullback devices utilize a series of cables attached to the operator's hands, wrists, and/or arms. This type of device is primarily used on machines with stroking action. When the slide/ram is up between cycles, the operator is allowed access to the point of operation. When the slide/ram begins to cycle by starting its descent, a mechanical linkage automatically assures withdrawal of the hands from the point of operation.


Safe guarding action

As the machine begins to cycle, the operator's hands are pulled out of the danger area

Advantages

Eliminates the need for auxiliary barriers or other interferences at the danger area

Disadvantages

- Limits Movement of operator
 - May obstruct work space around operator
 - Adjustments must be made for specific operations and for each individual
 - Requires frequent inspections and regular maintenance
 - Requires close supervision of the operator's use of the equipment
- 

Safety trip controls provide a quick means for deactivating the machine in an emergency situation. A pressure-sensitive body bar, when depressed, will deactivate the machine. If the operator or anyone trips, loses balance, or is drawn toward the machine, applying pressure to the bar will stop the operation. The positioning of the bar, therefore, is critical. It must stop the machine before a part of the employee's body reaches the danger area.


Safe Guard Action

- Stops machines when in use

Advantage

- Simplistic to use

Disadvantages

- All controls must be manually activated
 - May be difficult to activate controls because of their location
 - Only protects the operator
 - May require special fixtures to hold work
 - May require a machine brake
- 

The two-hand control requires constant, concurrent pressure by the operator to activate the machine. This kind of control requires a part-revolution clutch, brake, and a brake monitor if used on a power press. With this type of device, the operator's hands are required to be at a safe location (on control buttons) and at a safe distance from the danger area while the machine completes its closing cycle.



Safe Guard Action

Concurrent use of both hands is required, preventing the operator from entering the danger area

Advantages

- Operator's hands are at a pre-determined location
- Operator's hands are free to pick up a new part after first half of cycle is completed

Disadvantages

- Requires a partial cycle machine with a brake
- Some two-hand controls can be rendered unsafe by holding with arm or blocking, thereby permitting one-hand operation
- Protects only the operator

Another variation:

Another variation of two-hand controls devises that require constant pressure by the operator to activate the machine. The operator's hands are required to be at a safe position or location on the control buttons and at the specified safe distance from the danger area to enable the machine to continue and to complete its cycle.



Gates

The gate is a moveable barrier that protects the operator at the point of operation before the machine cycle can be started. Gates are, in many instances, designed to be operated with each machine cycle. To be effective, the gate must be interlocked so that the machine will not begin a cycle unless the gate guard is in place. It must be in the closed position before the machine can function. If the gate is not permitted to descend to the fully closed position, the press will not function.

Another potential application of this type of guard is where the gate is a component of a perimeter safeguarding system. Here the gate may provide protection not only to the operator but to pedestrian traffic as well.

Safeguard Action

- Provides a barrier between danger area and operator or other personnel

Advantages

- Can prevent reaching into or walking into the danger area

Disadvantages

- May require frequent inspection and regular maintenance
- May interfere with operator's ability to see the work

Planning for Distance and Location Safe Guarding

- Sometimes the location of a machine in the workplace and the distance of the work force and the machine operators can be documented and used as a safe guard.
- Dangerous moving parts of a machine must be strategically placed to keep the dangerous and hazardous areas inaccessible and away to general workers and machine operators.
- A thorough hazard analysis of each machine and particular situation is absolutely essential before attempting this safeguarding technique.
- To consider a part of a machine to be safeguarded by location, the dangerous moving part of a machine must be so positioned that those areas are not accessible or do not present a hazard to a worker during the normal operation of the machine.
- Keep in mind that drive mechanisms and power systems will need to be maintained, inspected and repaired periodically so be careful not to eliminate access to those who need access.

Feeding the Ejection Methods to Improve Operator Safety

- Many feeding and ejection methods do not require the operator to place his or her hands in the danger area. In some cases, no operator involvement is necessary after the machine is set up. In other situations, operators can manually feed the stock with the assistance of a feeding mechanism. Properly designed ejection

methods do not require any operator involvement after the machine starts to function.

- Some feeding and ejection methods may even create hazards themselves. For instance, a robot may eliminate the need for an operator to be near the machine but may create a new hazard itself by the movement of its arm.
- Using these feeding and ejection methods does not eliminate the need for guards and devices. Guards and devices must be used wherever they are necessary and possible in order to provide protection from exposure to hazards.

Types of feeding and ejection methods...

Automatic feeds reduce the exposure of the operator during the work process, and sometimes do not require any effort by the operator after the machine is set up and running

Additional Methods to alert workers to dangerous and Hazardous areas

Despite all of the methods contained in this training they still do not provide complete protection from machine and machine tool hazards however they do provide an extra margin of safety.

Good old common sense and wise judgments are still needed to operate and work around machinery, tools and moving parts.

Personal Protective Equipment

Engineering and Administrative Controls are in place to lessen the likelihood that any worker or general bystander will be injured. These controls are not impervious of fault. Personal Protective Equipment or (PPE) is the last line of defense still needed to ensure the safest work environment.

Personal Protective Equipment or (PPE) is any device or garment worn by a worker on the job to safe guard against injuries and or harmful effects of hazardous substances.

Examples of PPE are:

Clothing such as Coveralls, Gloves & Sleeves, outer, chemical-resistant, Gloves, inner, chemical-resistant, Boots (outer), chemical-resistant steel toe and shank, or Boot-covers, outer, chemical-resistant (disposable), Hard Hats, Hair Caps and Nets, Face Shields,

Safety Goggles and Safety Glasses, Ear Plugs and Muffs. These types of PPE can be a requirement for specific applications in general industry.

Please note: Electrical applications require PPE specific to the "Electric Industry".

- **Hard Hat:** Used to protect the head from impact of bumps or falling objects.
- **Caps and Hair Nets:** Protect your hair from being entangled in machinery.
- **Face Shields, Safety Goggles and Safety Glasses:** Protect from chemical splash, particulates flying, and accidental loose objects that become airborne.
- **Hearing Protection: Ear Plugs, Ear Mufflers'** can protect your hearing in work environments where dangerous decibels of noise are constant.
- **Gloves & Sleeves:** Protect from cuts, light impacts, and rough edges and some chemical exposure.
- **Coveralls:** Protect general body area from cuts, light impacts, and some chemical exposure.
- **Boots:** Protect against bumps, light weight falling objects, rough edges and some chemical exposure.



PPE Hazards

PPE can cause additional hazards. Gloves have been caught in rotating parts, face shields and goggles can restrict full spectrum vision. Loose fitting coveralls, shirt sleeves and pants can be caught in moving machinery. Jewelry such as rings, bracelets and necklaces can catch on machine parts, stock and moving machinery. It is best not to wear jewelry when working near or with moving machines or machinery.

Education, Experience and Familiarity with the machines, machinery and your working environment is the key to avert potential injuries, problem areas and hazards. Workers and their management should make sure that machines are equipped with compliant safety accessories suitable for the hazards of the machine operator.



Workers and their management should make sure that machine operators are properly trained



Workers and their management should make sure that machines and the safety equipment are inspected daily to ensure they are in proper working condition.



- Workers and management should make sure there are compliant records that identify the machine, the required inspection dates specified by the manufacturer, worker, maintenance and management inspections, the inspection date, problems noted, who performed the inspection and any corrective action taken.
- Accurate recordkeeping is a requirement and by noting problems assists to ensure that corrective action will be taken. Manufacturer's specifications should be exercised first and foremost. Authorized, specifically trained and certified personnel by the manufacturer should always be consulted prior to any alterations or repairs. In addition their recommendations need to be kept on record.



Regulations and manufacturer guidelines are in place to so that employers follow an industry standard to ensure a safe and healthy environment.

Have a safe work day!

