THE UOSH SAFETY LINE
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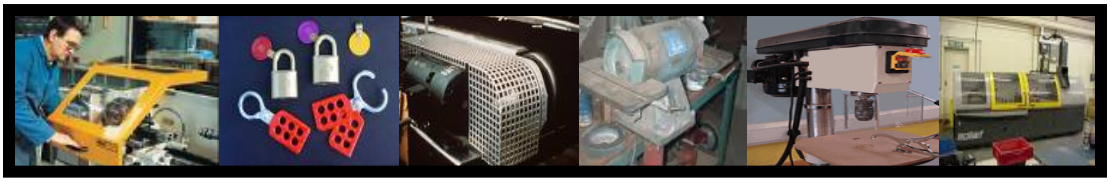
Work related fatalities, serious injuries and imminent danger situations are to be reported to UOSH within 8 hours of the injury. Report seven days a week by calling 801-530-6901.

State of Utah Labor Commission
Utah Occupational Safety & Health Division

Workplace Safety and Health Emphasis Initiative
Industrial Machine Guarding and Control of Hazardous Energy (LOTO)



Machinery is used in many operations and by many employees in Utah. Amputations can and do occur when machinery is not adequately guarded when in use or locked-out during maintenance procedures. In fact, according to the Bureau of Labor Statistics, in the United States workers who operate and maintain machinery suffer over 18,000 amputations, lacerations, crushing injuries, abrasions; and over 800 deaths per year. Amputation is one of the most severe and crippling types of injuries in the occupational workplace, and often results in a permanent disability. Not only do these types of injury affect the worker, it also has a tremendous impact on the worker's family and the community.

Utah OSHA is taking proactive steps to decrease, accidents resulting in amputations and other serious disabling injuries. Through compliance inspections and evaluation of industries where machine-related accidents are prevalent, accidents can be prevented. Commencing immediately, those establishments included in this initiative (see included industry groups below) which have experienced a total injury rate above the 2008 and 2009 Bureau of Labor Statistics state average rates for their specific industry, may be evaluated and considered for a compliance comprehensive inspection during this emphasis initiative. A comprehensive inspection is a complete and thorough inspection of all potentially hazardous areas of the establishment. This type of inspection is also known as a "Wall to Wall" inspection. The industry groups (North American Industrial Classification System-NAICS) included in this initiative are:

311xx - Food manufacturing, state average total rate 6.8

314xx - Textile mills, state average total rate 4.2

321xx - Wood products manufacturing, state average total rate 7.8

322xx - Paper manufacturing, state average total rate 4.0

326xx - Plastic and rubber manufacturing, state average total rate 6.4

333xx - Machine manufacturing, state average total rate 5.8

337xx – Furniture manufacturing, state average total rate 6.7

We remain committed to the safety and health of Utah's workers. For more information, visit the Utah OSHA website at www.uosh.utah.gov or contact Eldon Tryon, UOSH Compliance Manager at 801.530.6901.

In addition, the Utah Labor Commission OSHA Consultation Program is a cooperative effort available at no charge to small businesses in high hazard industries. For assistance with workplace safety and health, small business owners may contact Kate McNeill, OSHA Consultation Program Manager at 801.530.6868.

MACHINE GUARDING

There are various types of machines that require guarding and the appropriate types of guards to be used. Understanding machine guarding is very important. Many workers must use a machine, tool, or piece of equipment in their jobs. Workers often do not understand the dangers within the machine itself and why guards or barriers are necessary. Employees often believe that guards get in their way. However, they fail to realize that it only takes a second for an injury to happen; a distraction can cause a finger, hand, arm, or other body part to come in contact with part of the machine. It is important for employees to understand that guards are provided to protect them from injury.

The Occupational Safety and Health Administration (OSHA) in 29 CFR 1910.212 require that "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 chips and sparks." If there is the potential of an employee coming in contact with a piece of moving machinery, it must be guarded.

In order to understand the concepts of machine guarding, there are three fundamental areas of a piece of machinery that should be guarded. These areas are the point of operation, the power transmission device and the operation controls.

- The point of operation is defined as the point where the work is being performed on the material. This would include cutting, shaping, boring or forming stock.
- The power transmission device is defined as all the parts/components of the mechanical system, which transmits energy to the part of the machine performing the work. This includes pulleys, belts, connecting rods, chains, gears, spindles and flywheels.
- The operation controls are defined as all the other moving parts of the machine, which move while the machine is in operation. This includes reciprocating, rotating, and transverse moving parts, as well as feed mechanisms and auxiliary parts of the machine.

When trying to determine what parts of a machine need to be guarded, look for motions or actions that could possibly present a hazard to the employee. These can be divided into two categories:

Motions	**Actions**
Rotating	Cutting
In-running nip point	Punching
Reciprocating	Shearing
Transversing	Bending

Machinery can present hazards to employees. To better understand and protect employees from these motions and actions, each will be defined.

- Rotating motion is when a part or piece of machinery turns around on an axis. It can grab hair, fingers, clothes, or other body parts and twist and pull them into the machinery.
- In-running nip points are a type of rotating motion. There are three main types:
  - ◊ Parts rotating in opposite directions while their axes are parallel to each other. Example: rollers
  - ◊ Rotating movement between a straight part and a round part. Example: belt and pulley or bicycle chain.
  - ◊ Rotating movement against a fixed part. Example: an abrasive wheel and the work rest.
- Reciprocating motion is when a part or piece of machinery moves back-and-forth or in an up-and-down motion. This can cause an employee to get struck by or caught between a moving and stationary part. Example: a piston in an internal combustion engine.
- Transversing motion is movement in a straight, continuous line. Example: a belt drive.
- Cutting action involves all three types of motion, rotating, reciprocating, and transversing. The actual danger of the cutting action occurs at the point of operation. Example: various saws on wood or a drill bit coming into contact with material.
- Punching action is when power is applied to a ram for the purpose of stamping materials. The danger of the punching action occurs at the point of operation where the material is inserted, held, and removed. Example: power presses.
- Shearing action occurs when power is applied to a slide/knife in order to trim or cut materials. The danger of the shearing actions occurs at the point of operation where the material is inserted, held, and removed. Example: sheet metal brake.
- Bending action is when power is applied to a slide in order to stamp and draw materials. Example: tube benders and power presses.

Now that the hazardous actions and motions have been defined, each piece of equipment located at your facility should be evaluated for the appropriate safeguards. A hazard assessment should be conducted to determine if any of the machinery used by the employer is dangerous or has missing guards. Evaluate the equipment looking for the following types of parts: belts and pulleys, flywheels and gear wheels, shafts and spindles, slides, chain and sprocket gears, guillotine blades, circular saws, and drills and chucks. (This list is not all-inclusive)

Look for machinery action related to shear and stabbing points, and crushing, cutting, entanglement, and abrasion areas, anywhere something could be drawn into the machine and any protrusion that could cause an injury.

OSHA has developed a machine guarding checklist to help assist agencies in evaluating the hazards associated with machinery. This checklist can be obtained at the following website: http://www.osha.gov/Publications/Mach_SafeGuard/checklist.html.

Once these hazards have been identified, OSHA requires the hazards to be controlled or eliminated. In most cases, guards or barriers will have to be installed to help control the hazard. There are several types of guards that can be used. They include:

- Fixed guards – do not have moving parts and prevent contact between the moving machinery and any part of the body.
- Interlocked guards – are moveable, with the moving part interconnected to control system of the machinery. Guards of this type are usually electrical, mechanical, hydraulic, pneumatic, or a combination. The interlock only allows the machine to operate when the guards are closed.
- Adjustable/self-adjusting guards – are flexible and allow the guard to move to accommodate various sizes of material. This is commonly seen on various types of saws.
- Automatic guards – move into position when the machinery is activated. They are also known as push away, push back, or pull back guards.
- Trip guards – stops the machinery when a person gets into a dangerous position and could be injured. Examples of theses types of guards are:
    - ◊ Photoelectric
    - ◊ Radiofrequency
    - ◊ Electromechanical
- Pullback/restraint guards – use a series of cables or straps attached to the employee's hands, wrists, or arms and allows the employee only a limited range of motion. This prevents the employee's body parts from entering a danger zone.
- Multiple hand controls – require that the employee provide concurrent pressure with both hands to activate the machinery. There are some controls that may also require the use of a foot pedal to ensure the employee's body is out of the danger zone.
- Distance guards – prevent the employee from entering a dangerous area while the machinery is in operation. They are also known as gates or shields.

Determining the type of guard that is required for the machinery will be dependent on the hazardous motions or actions identified. Many times manufacturers have already determined the proper guards and either include them with the machinery or as an additional option for purchase. It is up to the emploer to implement and enforce the use of guards on equipment. While guarding equipment is an important injury prevention measure, OSHA also has set some minimum guidelines that all guards must meet, including:

- The guards must be able to prevent an employee's body part from making contact with any moving part of the machinery.
- The guards should not be easy to tamper with or to remove.
- The guards should protect against falling objects.
- The guard itself should not create a hazard in and of itself.
- The guards should not interfere with the employee's task.
- The guards should be constructed so that they do not have to be removed during lubrication.

Guards are installed on all kinds of machinery and equipment. Common everyday machinery that require guards are abrasive wheels, saws, and other hand and power tools. These tools are often overlooked and not recognized as needing guards. Safety switches on hand-held power tools such as drills, grinders, sanders, and reciprocating saws can be considered a guard. This switch requires constant pressure to activate the machinery. Employees should be discouraged from taping the switch in the "on" position. Abrasive wheels should be equipped with guards to protect the employee from the moving wheel and flying fragments in the event the wheel breaks. Pneumatic tools should be equipped with a variety of guards to prevent injury. They include the positive locking device to prevent the hose from separating from the tool and becoming a whip. Additionally, a safety clip should be installed to prevent the attachment from becoming a projectile if it disconnects from the tool. Circular saws, band saws, table saws, and other saws should not have the guards taped back or removed. This prevents an injury at the point of operation. OSHA has several good illustrations and resources located on their website at http://www.osha.gov.

Employees are exposed to a variety of hazardous motions and actions associated with machinery. Many accidents and injuries are related to work practices involving the use and care of the machines. Some injuries are the result of improper lockout/tag out procedures or improperly mounted/installed machinery. Other injuries are related to removing or bypassing guards, or from using improper guards. Some injuries are the result of employees not being properly trained in the maintenance and use of the equipment. These employees may not recognize the hazards associated with the machinery. Additionally, employees may not have adequate personal protective equipment.

Remember to evaluate your machinery for hazards and determine if the appropriate guards are in place. Look for the following potential conditions:

- Coming in contact or entanglement with machinery. Do not wear loose clothing, ties, jewelry, long hair, or gloves.
- Becoming trapped between machine and fixed structure
- Coming in contact with material in motion
- Being struck by parts of machinery
- Being exposed to the release of potential energy

If any of these conditions are evident, the employer needs to correct the hazards immediately to ensure they are protecting their workers.

MACHINE GUARDING CHECKLIST

____ 1. Guards are free of sharp edges, protrusion into walkways, etc., that cause the guard to be a hazard. (1910.212)

____ 2. Where drums or barrels are revolving (tumble blending) to blend materials, an enclosure with the entrance interlocked with the drive is present and functions properly. (1910.212)

____ 3. Fans which are less than 7 feet above the floor are guarded with openings 1/2' or less. (1910.213)

____ 4. Machines designed for a fixed location are securely anchored to prevent them from walking or moving. (1910.212)

____ 5. Table saws have guards which enclose the blade above the table and when cutting, the exposed blade above the material being cut. (1910.213 (c):

____ 6. Disk sanding machines have a guard enclosing the revolving disk. (1910.213 (p))

____ 7. Belt sanding machines have guards at each nip point where the sanding belt runs into a pulley. (1910.213 (p))

8. Grinding wheels have (1910.215):

____ a. Work rests adjusted to within *1/8"* of the wheel.

____ b. A guard over the spindle end, nut and flange projections.

____ c. For most grinders, the acceptable unguarded opening is 65 deg. above the horizontal and 90 deg. total maximum exposure.

____ 9. Friction brakes are capable of quickly stopping the operation of the press and holding the slide in constant position

10. Foot operated presses (1910.217 (4)):

____ a. Have pedals protected to prevent accidental activation of the machine by falling objects or accidentally stepping on the pedals.

____ b. Pads on the pedal have nonslip contact areas.

____ 11. Hand lever operated power presses have a spring latch on the operating lever. (1910.217 (5))

____ 12. The operating levers on the hand-tripped presses having more than one operation are interlocked to prevent the tripping of the press except by the concurrent use of all levers. (1910.217 (6))

____ 13. On machines using part revolution clutches in addition to the above: A red color stop control is used to open the clutch, apply the brake, and stop the machine. (1910.217 (7))

____ 14. The main power disconnect switch on each machine is capable of being locked only in the main of position. (1910.217 (8)

____ 15. The motor start button is protected by a guard, cover, etc., to prevent accidental operation. (1910.217 (8))

____ 16. Mechanical power presses controls have drive motor starters that automatically disconnect from the power source when there is a power failure. (1910.217(8))

____ 17. Electrical clutch/brake control electrical circuits have features which will prevent an accidental ground in the control circuit causing false operation of the press. (1910.127 (8))

18. For mechanical power-transmission apparatus (1910.219):

____ a. Flywheels set seven feet or less above the floor, or platform is guarded either with an enclosure or guardrail. The guard must have sufficient strength to control the flywheel in the event the shaft fails.

____ b. All crank and connecting rods when exposed to contact are guarded.

MACHINE GUARDING CHECKLIST continued

19. All point of operation guards (1910.217 (c) (2)):

____ a. Prevent entry of hands or fingers into the point of operation by reaching through, over, under, or around the guard.

____ b. Comply with the following table which shows the distances that guards be positioned with the indicated opening in the guard.

If the employees can get close to the point of operation— then the maximum width of opening for access is:

Point of Operation Hazard (inches)	Width of Opening (inches)
1/2 to 1-1/2	1/4
1-1/2 to 2-1/2	3/8
2-1/2 to 3-1/2	1/2
3-1/2 to 5-1/2	5/8
5-1/2 to 6-1/2	3/4
6-1/2 to 7-1/2	7/8
7-1/2 to 12-1/2	1-1/4
12-1/2 to 15-1/2	1-1/2
15-1/2 to 17-1/2	1-7/8
17-1/2 to 31-1/2	2-1/8

____ c. Do not create a pinch point between the guard and moving machine parts.

____ d. Are secured in place by fasteners which are not readily removable (unless interlocked).

20. Where power presses are not equipped with point of operation guards check the following:

____ a. A device to prevent and/or stop the press if the operator's hands are inadvertently placed in the point of operation (e.g., light beam which when broken stops the press or restraints).

____ b. A device such as cables are connected to the employee's wrists that prevent the employee from placing his/her hands in the point of operation.

____ c. Two hand controls exist.

____ d. The distance of each control from the point of operation is appropriate.

____ e. The hand controls must be mounted so that an operator cannot easily move them or press both with one hand or arm.

____ 21. Dies to control or eliminate hazards are stamped with the tonnage and stroke requirements. (1910.217 (6))

____ 22. Die handling equipment with attach points is provided on all dies requiring mechanical handling. (1910.217 (8))

____ 23. Inspection or presses are done weekly and records are available covering the inspection of (1910.217 (e)):

____ a. The condition of the clutch/brake mechanism.

____ b. Anti-repeat and single stroke mechanisms.

____ c. All guards are in place.

____ d. All other safety features of the press are in operating condition and properly adjusted.

____ 24. Employees are trained in inspecting and maintaining power presses. (1910.217 (3))

____ 25. A checklist covering the inspection of power transmission equipment is completed every 60 days and kept in good working condition at all times. (1910.219 (p))

Reminder about Changes to Hex Chrome Standard

An amendment to OSHA's Hexavalent Chromium standard requiring broader employee notification of exposures is scheduled to go into effect June 15, 2010. Announced May 14, the direct final rule amends the four-year-old standard to require employers to inform affected workers of all exposures to hex chrome, regardless of whether the exposures fall above or below the permissible exposure limit (PEL). In the original 2006 hex chrome rule, employers only had to notify workers when the exposure exceeded the PEL.

Safety Compliance Corner

Question: Are safety signs a method of control for machine guarding?

No, employers often think they are demonstrating their commitment to safety by posting signs around the workplace such as: "Be safe, use machine guards", "Always use your protective equipment". Safety signs **do not** protect your worker and **do not** remove hazards.

Safety signs are a great reminder or a warning about probable dangers. And if they are used as safety reminders, signs can increase the safety awareness about machine guarding. If utilized, signs should be changed regularly and placed where you can easily see them. **Remember: a safety sign does not protect the worker from a hazard.**

Question: If I purchase equipment from the manufacturer can I assume that it will have all the proper machine guards in place?

No, employers are responsible to ensure that their workers are protected and that proper guards are in place. The guards or pieces of equipment are sold separate from the machine. Some machines may need custom or after market guards. The type of guard required may change depending on the location, use, or type of installation of the equipment.

Whenever installing new equipment, or regularly with all existing equipment an employer should evaluate all machinery for proper guarding. The evaluation should include looking for guards that ensure that the operator's hands, fingers, and bodies are kept safely away from the danger areas when a machine is being operated? If they are not, determine what type of guard could be installed. Remember to check starting and stopping controls to ensure they are in easy reach of the operator.
Also check belts, pulleys, chains, sprocket, gears, and blades to ensure they are properly guarded with all rotating parts covered. Check guards to see that they are firmly attached so they can not easily be removed.

Remember: the employer is responsible to control the hazard. And protect the worker.

Protection From Heat Stress

Workers who are exposed to extreme heat, or work in hot environments, may be at risk of heat stress. Exposure to extreme heat can result in occupational illnesses and injuries.

Workers at risk of heat stress include outdoor workers and workers in hot environments such as firefighters, bakery workers, farmers, construction workers, miners, boiler room workers, factory workers, and others.

Workers at greater risk of heat stress include those who are 65 years of age or older, are overweight, have heart disease, or high blood pressure, those that take medications may also be affected by extreme heat.

Heat stress can result in heat stroke, heat exhaustion, heat cramps, or heat rashes when the body is unable to cool itself by sweating.

Heat can also increase the

risk of injuries in workers as it may result in sweaty palms, fogged-up safety glasses, and dizziness.

Burns may also occur as a result of accidental contact with hot surfaces or steam.

Summer is the time of year that many workers are involved in outside work. The heat in the summer increase the hazards in the work place. Heat is one of the hazards that workers need protection from.

Some of the factors that lead to heat stress are: high temperatures and humidity, direct sun or heat, limited air movement, physical exertion, and poor physical condition.

Some symptoms of heat exhaustion that may be experienced are headaches, lightheadedness, fainting, upset stomach or vomiting, and mood changes.

Some symptoms of heat stroke are dry hot skin with no sweating, mental confusion or loss of consciousness, seizures or convulsions.

Heat stress can be prevented by monitoring for the symptoms, blocking out direct sun or other heat related sources, resting regularly, drinking water or sports drinks every 15 minutes, and wearing light-colored, loose-fitting clothing. Do not drink caffeine, alcohol, or eat heavy meals.

If a worker shows signs of a heat related illness move the person to the shade, loosen clothing, provide cool water, fan and mist the worker and call 911 if necessary.

Prevention of heat stress in workers is important. Employers should provide training to workers so they understand what heat stress is, how it affects their health and safety, and how it can be prevented.

Recommendations for Employers to Prevent a Heat Stress Incident

- Schedule maintenance and repair jobs in hot areas for cooler months.
- Schedule hot jobs for the cooler part of the day.
- Acclimatize workers by exposing them for progressively longer periods to hot work environments.
- Reduce the physical demands of workers.
- Use relief workers or assign extra workers for physically demanding jobs.
- Provide cool water or liquids to workers.
- Avoid drinks with caffeine, alcohol, or large amounts of sugar.
- Provide rest periods with water breaks.
- Provide cool areas for use during break periods.
- Monitor workers who are at risk of heat stress.
- Provide heat stress training that includes information about:
  - Worker risk
  - Prevention
  - Symptoms
  - The importance of monitoring yourself and co-workers for symptoms
  - Treatment
  - The use of personal protective equipment.

NEWS from the Utah Labor Commission

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Utah OSHA Consultation Announces:

"2010 YOUTH WORKER SUMMER SAFETY CAMPAIGN"

SALT LAKE CITY, June 14, 2010 - In an effort to increase awareness of the importance of teen summer job safety, the Utah Labor Commission's Occupational Safety and Health Consultation Program (Utah OSHA Consultation) announces its annual **YOUTH WORKER SUMMER SAFETY CAMPAIGN.**

"Teenagers are twice as likely to be hurt on the job as are their adult co-workers", said Utah Labor Commissioner Sherrie Hayashi. "Nationally, approximately 158,000 sustain work-related injuries, with 52,600 injuries serious enough to be treated in the emergency room. In 2008, 34 youth under the age of 18 died from work-related injuries. According to the U.S. Bureau of Labor Statistics, the leading causes of teenage deaths on the job during 2008 are: motor vehicle accidents; contact with electric current; oxygen deficiency, i.e., drowning, choking on an object or substance, depletion of oxygen in an enclosed, restricted or confined space; assaults and violent acts; and exposure to harmful environment or substance.

Each year, the Utah Labor Commission OSHA Consultation Program provides two booklets pertaining to Youth Workers and Workplace Safety.

"A Parent's Guide to Youth Workers" gives parents tools to talk with their children regarding safety practices in their workplace. The guide also contains information about what jobs a youth in Utah can and cannot do, listed by age; how to access the employers safety record (OSHA Compliance Inspections); who to contact if a youth has been injured, harassed, lost wages, placed in an unsafe position, or is asked to work excessive hours; and the Labor Commission's new online service, Workers' CompCheck, which can verify whether or not an employer carries workers' compensation insurance.

"The Youth Workers' Guide to Workplace Safety" provides information to the youth of Utah regarding their rights as workers. This guide also contains information on how to identify workplace hazards; how to keep safe in the summer sun ; what jobs youth in Utah can and cannot do, listed by age; who to contact if a youth has been injured, harassed, not paid wages, placed in an unsafe position, or works excessive hours.

For more information regarding these two booklets, please contact Kate McNeill, Utah OSHA Consultation Program Manager at 801-530-6855, or via e-mail at kmcneill@utah.gov. The booklets are also available for download on the Labor Commission website: http://www.laborcommission.utah.gov/UOSH/Outreach/OutreachMaterials.html

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