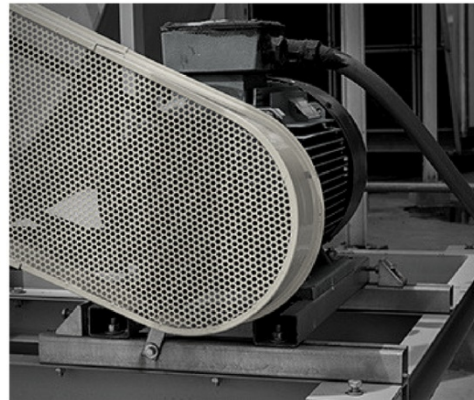


Trainer's Guide



MACHINE

GUARDING



A SUSAN HARWOOD GRANT

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Disclaimer:

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BE PREPARED!

INTENDED TARGET AUDIENCE:

The intended target audience for this training are workers and employers in high-hazard industries, temporary workers, minority, or other hard-to-reach workers, non-literate, low-literacy, or limited English proficiency workers, young workers (ages 16-24), or workers and employers in new small businesses.

TRAINER EXPERIENCE:

Trainers presenting this curriculum should have a minimum of three years' experience with this topic, should be knowledgeable in regards to OSHA's rules and regulations, and have a safety and health administration background.

TIPS:

What is the secret to confidence when giving a presentation? **BEING PREPARED!**

The following list is a guideline with items that you will need to help you give a successful presentation!

- Laptop with Accessories (charger, etc.)
- Electronic Copy of Presentation
- Projector
- Laser Pointer (with extra batteries)
- Microphone
- Mobile Wi-Fi Pack
- Speakers
- Document Holders
- OSHA Pamphlets (that coordinate with topic)
- Business Cards
- Pens
- Name Tags
- Pre-Printed Sign-in-Sheets
- Whistleblower Handout (OSHA Publication DWPP FS-3638 04/2018)
- Pre and Post Test
- Pre and Post Answer Key
- Activity with Answer Key
- Training Evaluations
- Machine Guarding Training Script

LOGISTICS

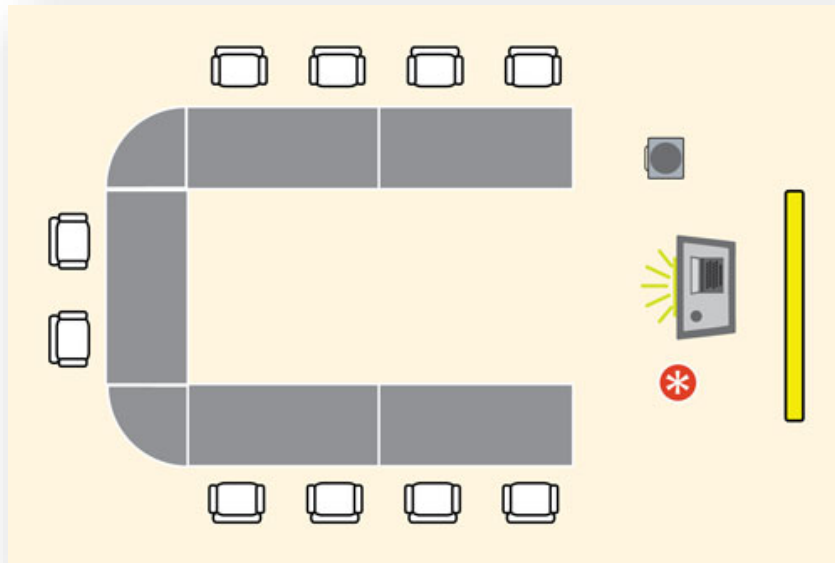
When providing training, you may not be in a location that you are familiar with. Allow yourself a minimum of 30 minutes to set up.

Somewhere towards the entrance of the room a table should be set up with your pre-printed sign in sheets, at least 2 pens, and your OSHA publications that students can take if they wish.

Arrange the room to promote active learning. According to Evergreen Safety Council's book, *Presentation & Training Techniques*, the room should be arranged for the learning situation. "A learner-centered arrangement allows for the learners to participate and to interact easily with the others in the group."

This style allows learners a relaxed environment where they are encouraged to participate while you still maintain control of the class.

When possible, the following classroom arrangement is highly recommended for an effective learning environment:



The Whistleblower Flyer, Pre-Test, and a pen should be at each place setting prior to the trainee's arrival. The center should be kept clear for activities.

Set up your projector, speakers, laptop, and other electronic equipment needed, tests the WIFI to ensure you have a strong connection and you are ready to go!

SCRIPT

Machine Guarding for General Industry

MACHINE GUARDING SCRIPT

The following is a script for a 2 hour Machine Guarding for General Industry presentation. You may tailor as you see fit.

Slide 1:

Good morning/afternoon, my name is _____ and is my colleague_____. We are with CSET's Safety Training Outreach Program otherwise known as STOP. CSET is the local community action agency for Tulare County. We have many programs that serve our community by providing education, training, youth services, and community development! This year, we were fortunate enough to receive the Susan Harwood grant sponsored by the Department of Labor, so today we are going to train everyone on the basic OSHA safety standards in machine guarding.

Slide 2:

The Susan Harwood training grant provides funding to eligible non-profit organizations to deliver safety and health training to eligible workers and employers. With this training, workers and employers will be able to recognize workplace safety hazards, incorporate accident prevention plans, and be informed of their rights and responsibilities as it pertains to OSHA.

Slide 3:

The primary law covering worker safety is the Occupational Safety and Health Act, or OSH Act, of 1970. The primary goal of this law is to reduce workplace hazards and implement safety and health programs for both employers and their employees.

The OSH Act created the Occupational Safety and Health Administration otherwise known as OSHA. OSHA sets and enforces workplace safety and health standards. As well as provide safety information, training, and assistance to employers and workers.

Slide 4:

One of the ways that OSHA protects workers is through the Whistleblower Protection Program. OSHA's whistleblower statutes protect you from retaliation. What does this mean? This means, an employer cannot retaliate against you for reporting injuries, safety concerns, or other protected activity.

You should always report any safety concerns to your immediate supervisor first. If you feel the safety concern was not resolved, you have the right to file an OSHA complaint. Under the Whistleblower protection program, you have the right to participate in an inspection or talk to an inspector, seek access to employer exposure and injury records, report an injury, and/or raise a safety or health complaint with the employer without fear of retaliation. If you feel you have been retaliated or discriminated against for exercising your rights, you must file a complaint with OSHA within 30 days of the alleged adverse action.

Slide 5:

Employers have a responsibility to provide a safe workplace environment, free from all recognized hazards. The workplace should comply with OSHA standards, rules and regulations.

Operating procedures should be established and communicated with employees, and employers must provide safety training in a language employees can understand.

Slide 6:

What does OSHA require from you? As an employee it is your responsibility to read any workplace safety, and health posters at your jobsite. Comply with all OSHA safety standards and follow all lawful employer safety and health rules and regulations. Always use and wear your personal protective equipment when required, and report hazardous conditions and job-related injuries as soon as possible.

Slide 7:

Ok guys, why is it important to know what your employer, and what you are responsible for? At the end of the day, we want everyone to go home to their loved ones. When you follow OSHA and workplace safety rules and guidelines, you are not just protecting the employee of an organization, you are protecting someone's mother, father, son, daughter, aunt, uncle, and the list goes on. Someone's loved one gets to go home to their family, and that is the ultimate goal of these safety trainings.

Slide 8:

In this presentation we will discuss key parts of a machine, hazards to be guarded, motions and actions, guarding methods, general requirements, power transmission apparatus, hand and power tools. All are essential to creating a safe workplace for you and those around you.

Slide 9:**Pre test****Slide 10:**

Many hazards are created by moving machine parts. Safeguards are essential for protecting workers from preventable injuries. OSHA requires that machines that expose an employee to injury must be guarded. A point of operation is the area of the machine where the machine performs work on a material such as cutting, shaping, boring, and forming.

A power-transmission device is all components of the mechanical system that transmit energy. Examples of this can include flywheels, pulleys, belts etc.

Slide 11:

An operation control is a mechanical or electrical power control on a machine that makes it possible for the operator to cut off the power from each machine without leaving his position at the point of operation.

Other key parts to a machine can include rotating and moving parts as well as feeding mechanisms.

Slide 12:

From crushed hands and arms, severed fingers, blindness, and even death, the list of possible machinery-related injuries is horrifying. Therefore, safeguards are essential for protecting workers from needless and preventable injuries.

A good rule to remember is this: 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, the hazard must be eliminated or controlled.

Slide 13:

Keeping that rule in mind, when working around machines that contains these hazards, the machine must be guarded. Areas to guard are: nip points, rotating equipment, flying chips or sparks, belt or gears, and parts that impact or shear. Doing so will protect employees from serious injuries such as amputations, cuts, and burns.

Slide 14:

Rotating parts are circular parts that are action generated by rotating couplings, flywheels, and spindles that may grip clothing or otherwise force a body part into a dangerous location.

Rotating motion can be dangerous; even smooth, slowly rotating shafts can grip clothing. The danger increases when projections such as screws, bolts, etc. are exposed on rotating parts.

Slide 15

Accidents can happen to anyone, even Queen Bey!

<https://www.youtube.com/watch?v=R1uHk7Z6z24>

Slide 16

In-Running Nip Points are also known as “pinch points.” A pinch point develops when two machine parts move together. They are created between a rotating and moving part. An example of this would be the point of contact between a power transmission belt and its pulley. Nip points can also occur between rotating and fixed parts which create a shearing, or crushing action.

Slide 17

This video contains graphic images. This is a real life situation where a workers arm was caught in a nip point.

<https://www.youtube.com/watch?v=-31yge5m5dc>

Slide 18

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.

Slide 19:

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

(Explain gif and show where the pinch point is)

Slide 20:

Now that we have covered the three types of motions, let's talk about actions. The first one being "cutting action". Cutting action is the action that cuts material. Looking at this slide, you see a drill bit cutting in to some material. What motion is this drill bit using? Rotating, reciprocating, or transverse? (wait for answers) Rotating, great!

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 anywhere. Such hazards are present at the point of operation in cutting wood, metal, or other materials.

Slide 21:

Punching action results when power is applied to a slide (ram) for the purpose of 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 with a handtool. So what motion is being used here? (wait for answers) Reciprocating! Awesome!

Slide 22:

Shearing Action involves applying power to a slide or knife in order to trim or shear metal or other materials. The hazard occurs at the point of operation where the employee typically inserts, holds, or withdraws the stock with a hand tool.

Slide 23:

Bending action results when power is applied to a material to draw or stamp it. The 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

Slide 24: **Activity**

As a group you will determine where the point of operation is located and the type of motion and action.

.

Slide 25:

OSHA Standards require that machine guards follow 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 the operator or another worker placing parts of their bodies near hazardous moving parts.

Secure guard: 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 which is dropped into a cycling machine could easily become a projectile that could strike and injure someone.

Create no new hazards: A safeguard defeats its own purpose if it creates a hazard of its own such as a shear point, a jagged edge. The edges of guards, for instance, should be rolled or bolted in such a way that they eliminate sharp edges.

Create no interference: Any safeguard should not be overridden or disregarded to do a job quickly. Proper safeguarding can actually enhance efficiency and ensure worker safety. When you feel safe on the job you are more relaxed and less apprehensive about doing your job.

Allow safe lubrication: If possible, one 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 the operator or maintenance worker to enter the hazardous area.

Slide 26:

There are many ways to safeguard machines. To determine the best guarding method you have to consider a few things, the type of operation, the size or shape of stock, the method of handling, the physical layout of the work area, the type of material, and production requirements.

As a general rule, power transmission apparatus' are best protected by fixed guards that enclose the danger areas.

We can group safeguards under five general classifications. The first two we will talk about are location/distance and guards.

Slide 27:

The first safeguarding method we will discuss is safeguarding by location/distance in situations where dangerous moving parts of a machine can't be guarded. This may be

accomplished by placing a machine so that the hazardous parts of the machine are located away from operator workstations. An example of this would be positioning a machine with its power transmission apparatus against a wall and leaving all routine operations conducted on the other side of the machine. You can also add barriers to restrict access to machines. Another possible solution is to have dangerous parts located high enough to be out of the normal reach of any worker as in this example here. The employee cannot physically reach the unguarded hazard therefore this hazard is considered safeguarded by location/distance.

The positioning of the operator's control station provides another potential approach to safeguarding by location. Operator controls may be located at a safe distance from the machine if there is no reason for the operator to tend it.

Slide 28:

As its name implies, a fixed guard is a permanent part of the machine. It is not dependent upon moving parts to perform its intended function. It may be constructed of sheet metal, screen, wire cloth, bars, plastic, or any other material. This guard is usually preferable to all other types because its simplicity.

Slide 29:

An interlocking guard shuts off or disengages power and prevents machine start-up when guard is open. An interlocked guard may use electrical, mechanical, hydraulic, or any combination of these. Replacing the guard should not automatically restart the machine. To be effective, all movable guards should be interlocked to prevent occupational hazards.

Slide 30:

Adjustable guards are useful because they allow flexibility in accommodating various sizes of stock. A band saw with an adjustable guard protects the operator from the unused portion of the blade. This guard can be adjusted according to the size of stock.

An adjustable guard may require frequent maintenance. The operator may make guard ineffective. This video will give us a good visual on what an adjustable guard is.

(Explain during video)

<https://www.youtube.com/watch?v=cMyzL1RykRY>

Slide 31:

A self-adjusting guard adjusts itself according to the movement of the stock. As the operator moves the stock into the danger area, the guard is pushed away, providing an opening which is only large enough to admit the stock. After the stock is removed, the guard returns to the rest position. This guard protects the operator by placing a barrier between the danger area and the operator. The guards may be constructed of plastic, metal, or other substantial material. (Review photograph and point out how the plastic shield adjusts as the worker pushes the wood through the saw.)

Slide 32:

The next classification of safeguarding is devices. A safety device may stop the machine if a hand or any body part is accidentally placed in the danger area. The device may restrain or withdraw the operator's hands, or require the operator to use both hands on machine controls, or perhaps provide a barrier which is synchronized with the operating cycle. All of these devices serve one purpose, to keep your hands and body out of the hazardous area.

Slide 33:

The photoelectric presence-sensing device uses a system of light sources and controls which can interrupt the machine's operating cycle. If the light field is broken, the machine stops and will not cycle. This device must be used only on machines which can be stopped before the worker can reach the danger area. The design and placement of the guard depends upon the time it takes to stop the mechanism and the speed at which the employee's hand can reach across the distance from the guard to the danger zone.

Slide 34:

Pullback devices use a series of cables attached to the operator's hands, wrists, or arms. This type of device is primarily used on machines with stroking action. When the ram is up between cycles, the operator is allowed access to the point of operation. When the ram begins to lower, a mechanical link automatically pulls back the hands of the employee from the point of operation.

Slide 35:

A restraint device utilizes cables or straps. The workers wrists are connected by cords and secured to a fixed anchor point. This limits the operator's hands from reaching the point of operation at any time. The cables or straps must be adjusted to let the operator's hands travel within a safe area. There is no extending or retracting action involved. Hand-feeding tools are often necessary if the operation involves placing material into the danger area.

Slide 36:

Safety trip controls provide a quick means for deactivating a machine in an emergency situation.

A pressure-sensitive body bar, when depressed, will deactivate the machine. If the operator or anyone trips, or loses their balance, applying pressure to the bar will stop the operation. The positioning of the bar is critical. It must stop the machine before a part of the employee's body reaches the danger area.

Safety tripwire cables are located around the perimeter of the dangerous area. The operator must be able to reach the cable with either hand to stop the machine.

All of these tripwire rods or other safety devices must be manually reset to restart the machine. Releasing the tripwire to restart the machine will not ensure that the employee is out of danger when the machine restarts.

Slide 37:

One way to guard an operator against hazards on a machine is using a two-hand control. A two hand control requires constant pressure by the operator to activate the machine. 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.

Slide 38:

A gate is a movable barrier that protects the operator at the point of operation before the machine cycle can be started. Gates are 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.

Slide 39:

The next classification of safeguarding is feeding and ejection methods, robots, and other miscellaneous aids.

Slide 40:

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.

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.

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.

Slide 41:

Robots perform work that would otherwise have to be done by an operator. They are best used in high-production processes requiring repeated routines where they prevent other hazards to employees. Robots are also suitable for operations where high stress factors are present, such as heat and noise. Robots may create hazards themselves, and if they do, appropriate guards must be used.

Slide 42:

Miscellaneous aids do not give complete protection from machine hazards, they may provide the operator with an extra source of safety.

An awareness barrier does not provide physical protection, but serves only to remind a person that he or she is approaching the danger area. Generally, awareness barriers are not considered adequate when exposed to the hazard exists.

Protective shields are another source of aid. Shields may be used to provide protection from flying particles, splashing cutting oils, or coolants.

Special hand tools may be used to place or remove stock, particularly from or into the point of operation of a machine. A typical use would be for reaching into the danger area of a press or press brake. Holding tools should not be used instead of other machine safeguards; they are merely a supplement to the protection that other guards provide.

Slide 43:

Break

Slide 44:

One or more methods of machine guarding will be used to protect employees from hazards such as those created by point of operation, nip points, rotating parts, and flying chips and sparks. These guards could be barrier guards, two-hand tripping devices, electronic safety devices, etc.

Guards should be attached to the machine where possible. If this is not possible, they should be secured elsewhere. It is important to remember that the guard should not be a hazard in itself.

Slide 45:

Remember, the point of operation is the area on a machine where work is performed. Machines that expose an employee to injury must be guarded.

Special hand tools used for placing and removing material from point of operation areas must allow easy handling of the material without the operator placing a hand in the danger zone. Tools will not replace the guards, but will aid in keeping the employee safe and out of the hazardous area.

Slide 46:

Revolving barrels, containers, and drums must be guarded by an enclosure interlocked with the drive mechanism, so the barrel, gun, or container cannot revolve unless the guard enclosure is in place.

When the blades of a fan is less than seven (7) feet above the floor or working level, the blades must be guarded. The guard must not have openings larger than one-half (1/2) inch.

Slide 47:

A machine that is designed for a fixed location must be securely anchored to a surface. This will prevent the machine from moving thus further reducing the hazard.

Slide 48:

Woodworking machines are used with the intent to process wood. They are usually powered by electric motors. Some examples of woodworking machines are table saws, or circular saws.

The most common hazards of working with woodworking machines come from the point of operation, kickbacks, flying particles, and other moving parts. To secure your safety you must guard the machine with a fixed guard, adjustable guard, or self-adjustable guard.

Slide 49

When working on machines that have abrasive wheels, guards should be used. The type of guard used will depend on the machine. The guard must cover the spindle end, nut, and flange projections. The safety guard must also be mounted so that it is properly aligned with the wheel. If you take a look at this example, there is a plastic guard that can come down at the front when the wheel is being used, however the sides remain unguarded.

Slide 50:

Work rests are used to support the piece you are working on. They are made out of a rigid construction and designed to be adjustable according to the wear of the wheel. Since they are closely adjusted to the wheel they should have a maximum opening of one-eighth inch to prevent the work from being jammed between the wheel and the rest. The work rest has to be securely clamped after each adjustment; you should never adjust it while the wheel is in motion. The work rest is also known as a tool rest.

Slide 51:

Exposure adjustment. Safety guards, where the operator stands in front of the opening, shall be constructed so that the peripheral protecting member can be adjusted to the constantly decreasing diameter of the wheel. The maximum angular exposure above the horizontal plane of the wheel spindle shall never be exceeded, and the distance between the wheel periphery and the adjustable tongue or the end of the peripheral member at the top shall never exceed one-fourth inch.

Slide 52:

Here is an example of the different types of guards you can use with a specific machine. Here this machine has two abrasive wheels. You can see the tool rests, faceguards and side guards that all help in preventing injury to the operator.

Slide 53:

When mounting an abrasive wheel, it is important to closely inspect it for damage. Check the spindle speed to ensure that the wheel you purchased does not exceed the maximum operating speed marked on the wheel. When you are ready to mount the wheel, you should tap it gently with a light, nonmetallic device. The handle of a screwdriver is perfect for a light wheel. You can use a mallet for heavier wheels. If there is no ringing sound when you tap the wheel, you should not use it. This wheel is not safe. This method is known as the "Ring Test". Let's watch what this test looks like when conducted.

Slide 54:

https://www.youtube.com/watch?v=52n8_-6cooY

Slide 55

The power transmission apparatus is all of the mechanical system which transmits energy to the part machine that actually performs the work. These components like flywheels, pulleys, and belts.

Slide 56:

Flywheels are a heavy revolving wheel in a machine that is used to increase the machine's momentum. Flywheels that are located less than 7 feet above the ground must be guarded with an enclosed sheet, metal, or woven wire.

Guardrails should be placed no less than fifteen 15 inches and no more than twenty 20 inches from rim. When a flywheel extends into a pit or is within 12 inches of floor, a standard toe board shall also be used.

Slide 57:

A shafting system plays an important role in transferring power from the main engine to the propeller. Each continuous line of shafting shall be secured in position against excessive endwise movement. All inclined and vertical shafts shall be securely held in position against endwise thrust.

Slide 58:

All exposed parts of any horizontal shafting located 7 feet or less from the floor must be guarded by a trough or stationary casing. Troughs must be enclosed from the sides, top, or bottom of the shafting depending on the location. (point out picture)

Slide 59:

Any ends of the shaft that stick out should have a smooth edge and should not project out more than one half of the diameter of the shaft unless it is guarded by a nonrotating cap or safety sleeve. Any unused keyways shall be filled up or covered.

Slide 60

Pulleys are wheels with a grooved rim around which a cord passes. It acts to change the direction of a force applied to the cord and is used to raise heavy weights. Pulleys that are seven 7 feet or less from the floor or working platform shall be guarded.

Pulleys serving as balance wheels on which the point of contact between belt and pulley

is more than six feet six inches from the floor or platform may be guarded with a disk covering the spokes.

Slide 61

Gears are a set of toothed wheels that work together to alter the relation between the speed of a driving mechanism which is like the engine of a vehicle, and the speed of the driven parts like the wheels. Gears shall be guarded with a complete enclosure or by a standard guard, at least seven 7 feet high extending six 6 inches above the mesh point of the gears. A band guard covering the face of gear and having flanges extended inward beyond the root of the teeth on the exposed side or sides.

Slide 62:

All projecting keys, set screws and other projections in revolving parts shall be removed or made flush or guarded by metal cover. Why would this be?

Slide 63:

Shaft couplings should be constructed so that they present no hazard from bolts, nuts, set screws, or revolving surfaces. They are permitted where they are covered with safety sleeves or are countersunk and do not extend beyond the flange of the coupling.

Slide 64:

Title slide

Slide 65:

When working with hand and power tools, the employer is responsible for the safe condition of tools and equipment used by employees; this includes equipment that employees bring in. Because of this, all tools need to be approved by your employer for use.

You should never use compressed air for cleaning. If you choose to, reduce the compressor to less than 30 pounds per square inch, only then is it allowed with chip guarding and personal protective equipment.

Slide 66:

When using any portable, power-driven circular saws whose blade diameter is greater than 2 inches, the saw needs to be equipped with guards above and below the base plate.

All hand-held powered circular saws having a blade diameter greater than 2 inches need to be equipped with a constant pressure switch or a control that will shut off the power when the pressure is released.

Slide 67:

Belt sanding machines must have guards at each nip point where the sanding belt runs onto a pulley. These guards should effectively prevent the hands or fingers of the operator from coming into contact with the nip points. The unused run of the sanding belt should be guarded against accidental contact. All cracked or defective saws must be removed from service.

Slide 68:

A tool retainer is the piece on the tip of the pneumatic tool that holds the bit in place. Every pneumatic tool should have one installed, without it, the bit may be ejected. Air hoses, and hose connections need to be used for the intended equipment.

Slide 69:

Post Test

Slide 70:

Evaluation

Slide 71:

End of Presentation

ACTIVITY

Machine Actions & Motions

Utilize the information you just learned, and determine the following:

- 1) Where the point of operation is, 2) What the motion and action is!

Locate the point of operation



(OOPS! This worker has no guard protecting him from the saw blade!)

Circle the motion:

Rotating

Reciprocating

Transversing

None

Circle the action:

Cutting

Punching

Shearing

Bending

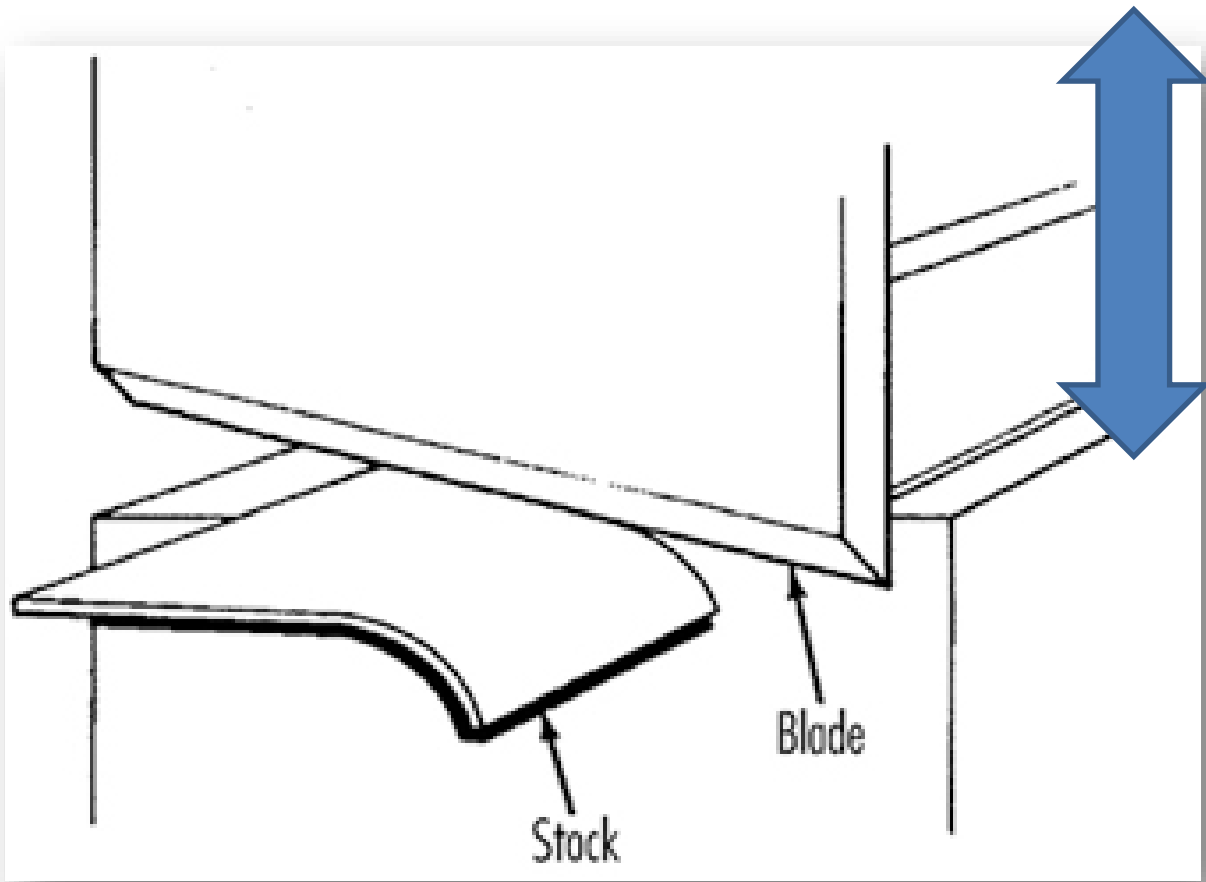
None

Machine Actions & Motions

Utilize the information you just learned, and determine the following:

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None

Circle the action:

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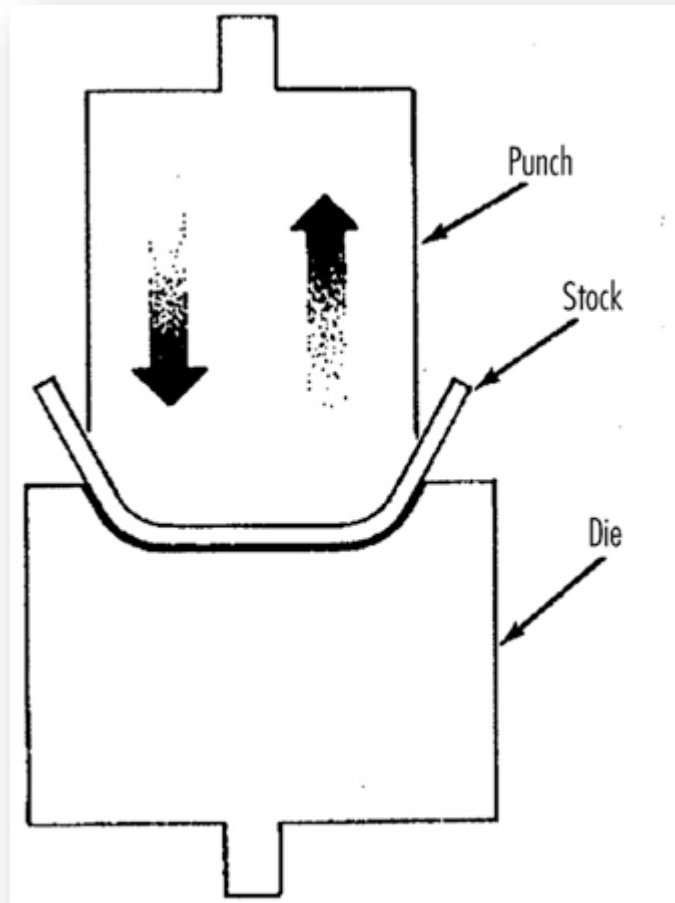
None

Machine Actions & Motions

Utilize the information you just learned, and determine the following:

1) Where the point of operation is, 2) What the motion and action is!

Locate the point of operation



Circle the motion:

Rotating

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Circle the action:

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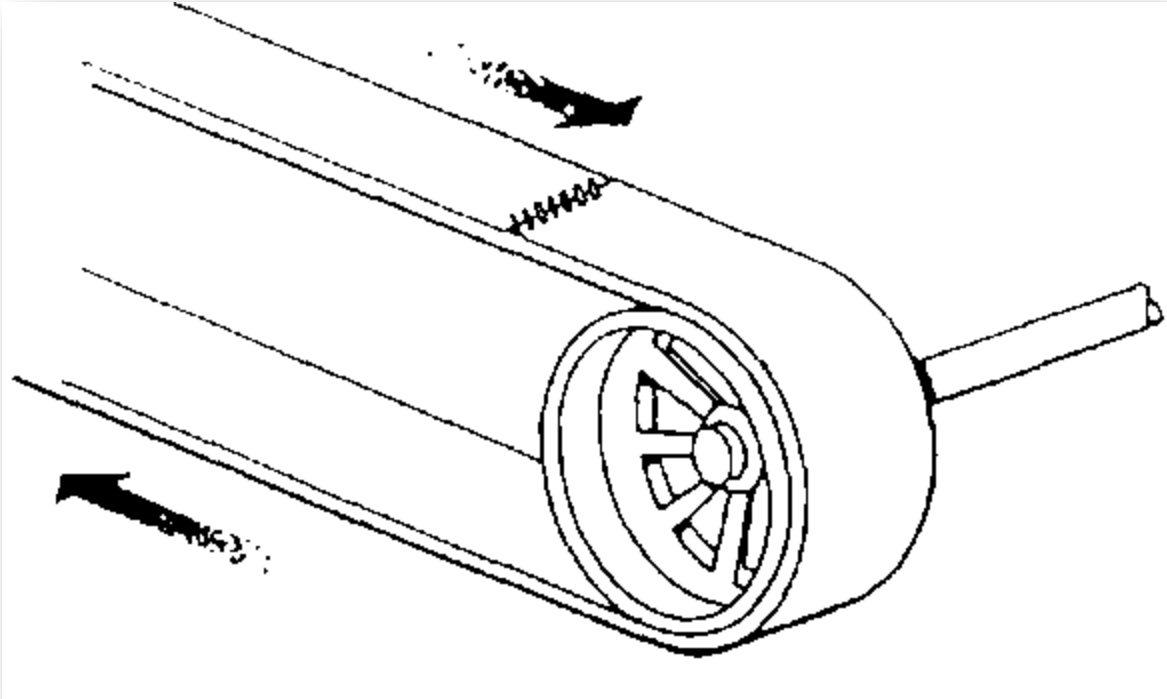
None

Machine Actions & Motions

Utilize the information you just learned, and determine the following:

- 1) Where the point of operation is, 2) What the motion and action is!

Locate the point of operation



Circle the motion:

Rotating

Reciprocating

Transversing

None

Circle the action:

Cutting

Punching

Shearing

Bending

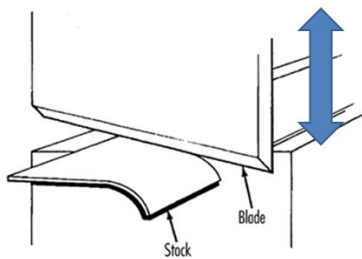
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Machine Actions & Motions

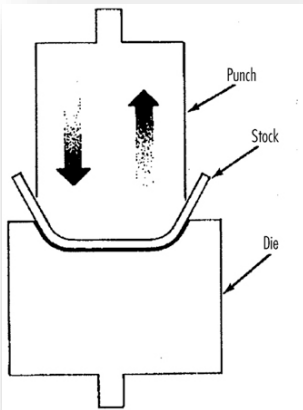
Answer Sheet



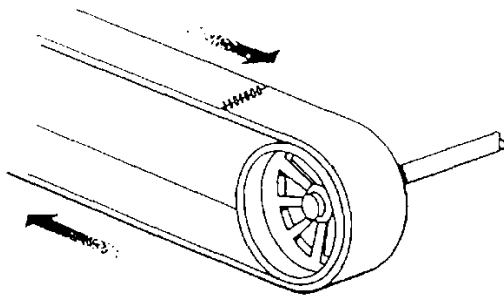
Motion: Rotating Action:
Cutting



Motion: Reciprocating Action: Shearing



Motion: Reciprocating Action: Bending



Motion: Transversing Action: None

LEVEL ONE TRAINING EVALUATION

Training Session Reaction Evaluation

Machine Guarding Evaluation Form

Please help us improve our training by providing your feedback below!

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. The training met my expectations.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. I will be able to apply the knowledge learned.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. The content was organized and easy to follow.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. The materials distributed were useful.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. The trainers were knowledgeable.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. The quality of instruction was good.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. The trainer met the training objectives.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Class participation and interaction were encouraged.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Adequate time was provided for questions and discussion.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. How would you rate the training overall?

Excellent

Good

Average

Poor

Very poor

11. What aspects of the training could be improved?

10. Other comments?

LEVEL TWO TRAINING EVALUATION

Learning Evaluations

Name: _____

Date: _____

Machine Guarding Pre Test

- 1. Point of operation means the point at which:**
 - A. an employee has a medical procedure done.
 - B. controller interacts with the gaming system.
 - C. the operator stands at the control panel to perform work.
 - D. work is performed on the material such as cutting, shaping, boring, or forming of stock.

- 2. What does a power transmission device do?**
 - A. Provides a guard that protects the employee from hazards.
 - B. Transmits energy to the part of the machine performing the work.
 - C. Uses light source to interrupt machine operating cycle.
 - D. Is a stand-alone barrier.

- 3. What is a nip point?**
 - A. A safety restraint
 - B. An awareness barrier
 - C. A point between rotating and fixed parts which shear, crush, or abrade.
 - D. A safety check point

- 4. A reciprocating motion is a motion that:**
 - A. Is a repetitive up and down or back and forth linear motion.
 - B. Flows in a continuous motion in one direction.
 - C. Goes back and forth in a circle.
 - D. None of the above

- 5. Which machine uses a cutting action?**
 - A. Sewing machine
 - B. Washing machine
 - C. Circular saw
 - D. Conveyor belt

- 6. Hazards to be guarded can include:**
 - A. In running nip points
 - B. Rotating equipment
 - C. Belts or gears
 - D. All of the above

- 7. The hazard in using a punch press comes at the _____?**
 - A. Operator starting the press
 - B. Point of operation
 - C. Handling the final product
 - D. There is no hazard

- 8. A _____ guard is a barrier that is a permanent part of the machine. It is not dependent upon moving parts to function.**
 - A. Self-adjusting
 - B. Fixed
 - C. Interlocked
 - D. Adjustable

Name: _____

Date: _____

Machine Guarding Pre Test

9. Pullback devices are:

- A. Body harnesses that pull you back like a bungee.
- B. A light source that controls a machine's operating cycle.
- C. A device located around the perimeter of a danger area.
- D. Attached to the operators hands or wrists, removes hands from the Point of Operation.

10. A machine will operate when a gate guard is open.

- A. True
- B. False

11. The following are considered miscellaneous aids:

- A. Awareness barriers, protective shields, and special hand tools
- B. Feeding, ejection methods, and robots
- C. Earmuffs, face masks, and gloves
- D. Goggles, steel toe boots, and hard hats

12. When performing a ring test on an abrasive wheel you will hear _____ if the wheel is undamaged:

- A. No noise
- B. A dull sound
- C. A clear ring
- D. Beyoncé

13. Gears, sprockets, and chains shall be guarded by the following:

- A. By a complete enclosure
- B. By a standard guard at least 7 feet high extending 6 inches above mesh point
- C. By a band guard covering the face of the gear
- D. All of the above

14. Compressed air must not be used for cleaning unless reduced to:

- A. 10 PSI
- B. 15 PSI
- C. 30 PSI
- D. 50 PSI

15. Who is responsible for the safe condition of tools and equipment on a job site?

- A. Employee
- B. Employer
- C. Human Resources
- D. OSHA

Name: _____

Date: _____

Machine Guarding Post Test

- 1. Hazards to be guarded can include:**
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Machine Guarding Pre/Post Test Answer Key

Pre Test Answer Key

1. (D) Where work is performed on materials such as cutting, shaping, boring, or forming of stock.
2. (B) Transmits energy to the part of the machine performing the work.
3. (C) A point between rotating and fixed parts which shear, crush, or abrade.
4. (A) Is a repetitive up and down or back and forth linear motion.
5. (C) A circular saw
6. (D) All of the above
7. (B) Point of operation
8. (B) Fixed
9. (D) Attached to an operators hands and wrists, removed hands from POO
10. (B) False
11. (A) Awareness barriers, protective shields, and special hand tools
12. (C) A clear ring
13. (D) All of the above
14. (C) 30 PSI
15. (B) Employer

Post Test Answer Key

1. (D) All of the above
2. (B) False
3. (A) Awareness barriers, protective shields, and special hand tools
4. (D) Where work is performed on materials such as cutting, shaping, boring, or forming of stock.
5. (C) A circular saw
6. (B) Transmits energy to the part of the machine performing the work.
7. (D) All of the above
8. (B) Fixed
9. (C) 30 PSI
10. (C) A point between rotating and fixed parts which shear, crush, or abrade.
11. (D) Attached to an operators hands and wrists, removed hands from POO
12. (C) A clear ring
13. (B) Point of operation
14. (B) Employer
15. (A) Is a repetitive up and down or back and forth linear motion.