



MACHINE GUARDING PROGRAM

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1.0 Purpose and Applicability

- 1.1 This policy is designed to ensure that University employees and students follow procedures which assure that equipment or machines are operated safely and meet state, federal and industry machine guarding standards.
- 1.2 This policy applies to all University employees and students who may work with, or adjacent to, equipment or machines that may pose a safety hazard.
- 1.3 Shops for carpentry, metal-working and finishing, heating, ventilating and air conditioning, electrical work, machinery, plumbing, electronics, printing and scenery, present special hazards for Towson University employees and students assigned to such areas. The operation of powered machinery, hand tools and powered tools in these shops can result in a variety of serious accidents.
- 1.4 The University shall take every precaution to protect its employees against possible injury from machinery, while in the vicinity of the machinery or while in the process of operating the machinery. Personnel and students shall be trained in the safe use of hand tools, power tools and other machinery, and counseled to take every precaution to prevent accidents. Personnel and students shall be properly supervised and provided the correct type of equipment, personal protective devices and safely guarded machinery to perform their assigned tasks.

2.0 Definitions and Scope

- 2.1 "Machines" include, but are not limited to, drill presses, bench grinders, radial arm saws, lathes, mills, abrasive wheel machinery, scroll saws and table saws. Any machine part, function, or process that 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.
- 2.2 A "machine hazard" occurs at the point of operation where the actual work is performed, and can be created by:
 - Components which transmit energy, such as pulleys, belts, chains, gears, couplings, or flywheels; or
 - Other parts which move while the machine is working, including reciprocating, rotating and transverse parts.

3.0 Roles and Responsibilities

- 3.1 The Facilities Management Department is responsible for ensuring guards on facility equipment and machines operated by facilities personnel are kept in place and used as originally designed. In academic areas, the Instructor, Lab Director, or Department Head is responsible for ensuring guards on machines operated by personnel or students under their supervision are kept in place and used as originally designed.
- 3.2 The Department of Environmental Health and Safety (EHS) is responsible for preparing and updating the written Machine Guarding Program and responding to any employee or student machine guarding concern or question.
- 3.3 University employees are responsible for reporting any unguarded machine hazard to their supervisor immediately.
- 3.4 All University employees should forward any student concerns or observations regarding the lack of machine guarding to their supervisor.

4.0 General Requirements

4.1 Electrical Power/Controls

Each machine must be equipped with a master switch that can be locked and tagged during repair or maintenance operations.

Power controls and operating controls must be located within easy reach of the operator at his/her regular workstation. Controls should be brightly marked and easily identified allowing the operator to cut off power at the point of operation.

Each machine must be provided with an appropriate electrical ground. A trip device must be provided on machinery where injury might result if motors were to restart after power failures. This prevents the machine from operating when electric service is restored.

Main "kill" switches should be centrally installed, easily identified and accessible to shop supervisors or co-workers for use in interrupting power in emergency situations.

4.2 Guarding

Appropriate guards are provided to protect the operator and others in the area from hazards such as exposed belts, pulleys, sheaves, drive shafts, drive couplings, chains rotating parts, flying chips and sparks.

No employee or student shall operate and/or cause to be operated, any machinery without proper protective devices in place.

Combs (feather boards) or suitable jigs must be provided for use when a standard guard cannot be used as in dadoing, grooving, jointing, moulding and rabbeting.

The operator should never perform layout, assembly or set-up work on the table/work area when the machine is running.

4.3 *Personal Protective Equipment*

All machine operators and assistants must wear appropriate eye protection (in accordance with ANSI Z87.1 and the TU Personal Protective Equipment Program) where the operation of the machine may produce flying objects or dust.

Hearing protection must be utilized for jobs that involve the risk of loss of hearing. See the TU Hearing Conservation Program.

Personnel must not wear loose fitting clothing or neckties while operating shop equipment. Gloves, rings, neck chains and other jewelry can be hazardous and must not be worn while operating or working on moving machinery. Long hair must be restrained to prevent poor visibility and being caught in the machinery.

Personnel are encouraged to wear heavy aprons when operating machinery that may produce kickbacks of stock.

Shoes must be worn at all times when working with or around the machinery. No sandals are allowed.

4.4 *Housekeeping*

Metal slivers, sawdust and other debris should be cleaned from the machine using a brush or rag. Never use bare hands for the task. NEVER clean a machine while it is in motion.

If available, the dust collection system should be used at all times. Combining wood dust and metal filings (or aluminum filings and metal filings) can create a fire hazard. Metal filings and wood dust should be kept separate at all times. Magnesium should not be sanded because it is highly flammable.

To reduce the airborne dust levels, compressed air may be used for minor cleaning purposes only after the majority of the dust has been cleaned up manually and where the pressure is reduced to less than 30 P.S.I. Appropriate ventilation and/or dust masks should be used. Eye protection must be worn while using compressed air to clean equipment.

Oily rags, waste, and other materials saturated with combustible substances must be disposed of in approved metal containers equipped with self-closing lids. These containers should be clearly marked for disposal of oily waste materials and must be emptied on a daily basis. Local exhausts should be installed on machines where large amounts of dust are produced, such as sanders and planers.

Safety zones surrounding machines should be established and marked. Machines should be spaced to allow for the establishment of safety zones.

5.0 Lockout and Tagging

Before any maintenance is attempted, the machine must be completely shut down and the control switch locked and tagged by the person performing the repairs. This will prevent accidental starting during the repair process. See the Towson University Lockout Tagout Program for complete lockout and tagging procedures and requirements. Only LOTO trained individuals can perform LOTO procedures.

6.0 Training

- 6.1 Only those personnel and students who are thoroughly trained by their supervisor or instructor in the operation of the specific piece of equipment can operate machines. All manufacturer's operation manuals and diagrams should be kept by the shop supervisor/instructor and made available to employees/students responsible for operating the machine. The shop supervisor or instructor should contact the manufacturer in writing or contact the Department of Environmental Health and Safety if insufficient information on the machinery could result in unsafe operations.
- 6.2 Shop supervisors and instructors are responsible for constant observation of shop practices to ensure that all safety regulations are being followed. When unsafe acts are noted, it is the supervisor's/instructor's responsibility to ensure that they are corrected and do not recur.
- 6.3 Employees and/or students cannot operate any machinery while under the influence of drugs, alcohol, or medication.

7.0 Procedure

7.1 Hierarchy of Guarding

Machine guarding decisions should be made in the following order of preference:

- Design out or eliminate the hazard
- Physically “engineer out” the exposure to the hazard
- Guard the hazard – Require personal protective equipment
- Use warning devices, or make the danger clearing apparent
- Use warning signs
- Use safe working practices and procedures

7.2 Inspections and Audits

Machines that require guarding will be inspected regularly. Based on the results of these inspections, maintenance or replacement of guards will be conducted as necessary. EHS will audit the program annually and recommend appropriate corrective actions.

8.0 Record Keeping

EHS will maintain records of every machine guarding inspection it generates. A copy of this inspection will be kept in the EHS Office, 7400 York Road, Suite 301, Towson, MD 21252.

9.0 Key References and Resources

The documents listed below may be obtained from the Department of Environmental Health and Safety.

- OSHA Machine Guarding Standard – 29 CFR 1910.212
- University's Machine Guarding Plan
- Towson University Lockout Tagout Program

Appendix A
MACHINES USED FOR BOTH WOOD-WORKING AND METAL-
WORKING

MACHINES USED FOR BOTH WOOD-WORKING AND METAL-WORKING

Buffing and Wire Brushing Wheels

Operators must wear eye protection when using buffing wheels, in order to protect against the dust particles generated during the buffing operation. Impact resistant goggles are preferred where the buffing operation is likely to produce large amounts of dust.

Operating wire brushing wheels can be especially hazardous because the wires tend to break off during operation, becoming high speed missiles. Goggles or face shields and leather gloves must be worn when operating wire brushing wheels. Use of an apron is encouraged to allow greater body protection.

Drill Presses

The most common causes of injury in drilling operations are: coming in contact with the drill bit; being struck by insecurely clamped materials being worked on; flying metal chips, or wood shavings; leaving the key in the chuck; and brushing shavings away with the bare hand.

General requirements include:

- Stock must be properly secured to the press to prevent accidental movement during drilling;
- The operator must not attempt to make measurements near the tool, reach across the table, or adjust the machine or stock while the machine is in motion;
- Operators and assistants must wear eye protection when operating or within close proximity of the drill press when it is being operated;
- All power transmission parts must be effectively guarded. A spring-safety guard is recommended to guard the drill bit and catch metal slivers and wood chips.

Lathes

The most common cause of injury in lathe operations are: contact with projections on work or stock; flying metal chips or wood shavings; hand breaking the machine; leaving the key in the chuck; and catching loose clothing or wiping rags in the revolving parts.

General requirements include:

- Operators and assistants must wear eye protection when operating the lathe or within close proximity of the lathe during operation;
- Operators must allow lathes to stop of their own accord. Hand pressure should never be used to stop spinning chucks after power has been turned off;

- Each exposed power transmission part must be effectively guarded for complete operator protection;
- Operators must avoid taking deep cuts when working with wood since this can result in the cutting tool being forcibly ejected;
- Operators must not wear loose clothing, long hair and jewelry that may become tangled in the revolving parts of the machinery;
- Stock must not be measured or calibrated while the lathe is in motion;
- Cutting heads must be covered as completely as possible by metal hoods or shields. The guard should be designed in such a manner as to allow easy access to make adjustments to the stock or cutting head. Where an exhaust system is used, the metal guard must form part of or the entire exhaust hood.

Appendix B
METAL-WORKING MACHINES

METAL-WORKING MACHINES

Milling Machines

Most milling machine accidents occur when operators unload or make adjustments. Examples include: failure to draw the job back to a safe distance when loading or unloading; leaving the cutter to remove chips while the machine is in motion; and using incorrectly dressed cutters.

General requirements include:

- Eye protection must be worn while operating such machinery;
- Shims, blocks and clamps must be used to hold stock in place. The operator must make certain that such clamping devices are mounted low enough to clear the arbor and cutter;
- The table must be lowered before backing work under a revolving cutter;
- Adjustments must not be made to the speed of the machine, the rate of feed or coolant flow, or other function, while the machine is in operation. If the machine is equipped with hand-adjusting wheels, they must be mounted on the shaft by clutches or ratchet devices, so that the wheels do not revolve when the automatic feed is used;
- Horizontal machines must have a splash guard and pans for catching thrown cutting lubricant and lubricant running from the tools;
- Hand tools must not be left on the worktable at any time;
- Operators must not reach around cutters to remove metal chips or debris. Brushes should be used to clean machines.

Metal Shapers

The most common causes of injury in shaping operations are: placing the hand or fingers between the tool and work; running the bare hand over sharp metal edges; measuring the job while the machine is running; and failing to clamp the work or tools securely before starting the cut.

General safety procedures include:

- Eye protection must be worn when operating power presses;
- Mechanical presses containing full revolution clutches must incorporate a single stroke device and an anti-repeat mechanism into the press system;
- Pressure on hydraulic presses must be bled off and switches locked out before maintenance is performed;
- Point of operation guards must protect the operator by one of the following methods by:

- Preventing and/or stopping normal stroking of the press if the operator's hands are inadvertently placed in the point of operation;
 - Preventing the operator from inadvertently reaching into the point of operation;
 - Designing the controls such that the operator must use both hands to operate the press and locating the controls at a safe distance from the point of operation;
 - Enclosing the point of operation before a press stroke can be initiated.
- Hand tools must be used to free and remove stuck work or scrap pieces from the die. This should never be attempted with hands.

A regular inspection program must be established and maintained to ensure that all parts, auxiliary equipment and safeguards are in good repair and properly adjusted.

Appendix C
WOOD-WORKING MACHINES

WOOD-WORKING MACHINES

Band Saws

The most common type of injury associated with band saws results when the operator's hand(s) make contact with the saw blade.

General regulations for the use of band saw include:

- Eye protection must be worn when operating band saws;
- The cutting edge of the blade must be completely enclosed by an adjustable guard, except at the point of operation.
- Both upper and lower drive wheels must be completely enclosed by solid metal, woven wire mesh or expanded sheet metal and securely fastened to the metal framework.
- Each saw must be provided with a tension control device to ensure proper operating tension at all times.
- Effective brakes must be provided to stop the wheel in case of blade breakage.
- The operator must use extreme caution to ensure that his hands are not exposed to the saw blade during operation.

Circular Saws

Table saws, radial arm saws, overhead swing saws, straight line pull cutoff saws, electrical miter saws and other machines containing circular saw blades are included in this section. Circular saw operators are most frequently injured when their hands slip off the stock while pushing it into the saw, or when holding the hands too close to the blade during the cutting operations. Injuries involving kickbacks are also quite common.

General regulations include:

- Eye protection must be worn when operating circular saws;
- Table saws must be equipped with a guard that protects the portion of the saw above the table. The guard must automatically adjust itself to the thickness of the material being cut in order to provide continuous protection from the blade.
- Table saws (unless self-fed with rollers or a wheel in the back of the saw) must be provided with a spreader fastened securely behind the saw. Circular ripsaws must be provided with sectional non-kickback fingers or dogs.
- The part of the saw blade underneath the table must be completely enclosed.
- Swing saws, radial saws and cutoff saws must be designed to return gradually and automatically to the starting position when released by the operator.
- Stock must be held against a gage, never sawed freehand. Freehand sawing endangers the hands and may cause work to get out of line and bind on the saw.

- The operator should stand out of the line of the stock he is ripping to avoid being injured by kickbacks. A heavy leather or plastic apron or abdomen guard gives additional protection.
- A circular saw should be stopped when the operator leaves it. Injuries have been caused by saws still coasting with the power off.

Sanding Machines

General requirements for personnel operating sanding machines including:

- Eye protection must be worn by operators and assistants;
- Dust respirators must be worn by those operating the machine, in close proximity of the operation, and/or when cleaning up (when ventilation does not provide adequate protection);
- Belt sanders must have guards placed at each in running nip point on the power transmission and feed roll parts;
- The unused run of the sanding belt must be guarded.
- Manually fed sanders must have a work rest which is used by the operator to support the work properly;
- Sanding belts should be the same width as the pulley-drum, should be free of cracks and badly worn spots and frays, and should be adjusted tightly against the pulley-drum before use.

Jointers

Hand-feed jointers are one of the most dangerous machines in wood working shops. They are responsible for injuries caused when operators catch their hands and/or fingers on the knives, especially when short lengths of stock are being jointed.

General requirements for jointers include:

- Operators must wear eye protection when working with the jointer;
- The jointer blade should be guarded as work is fed into it. A guard that adjusts itself covering the table on the working side of the gage is recommended. The unused end of the gage should be enclosed at all times.
- Push blocks with handles for both hands should be used for surfacing work or when jointing short pieces of stock.
- Jointers should have rounded heads no deeper than 7/16 inch, no wider than 5/8 inch. The openings between the table and the head should be just large enough to clear the knife.
- The clearance between the edge of the rear table and the cutter head must not be more than 1/8 inch. The table throat opening must not be more than 2 1/2 inches when tables are set with each other for zero cut.

Wood Shapers

Shapers can be dangerous when operator's hands are exposed to revolving knives. Severe accidents also result from broken knives thrown by the machine.

General requirements for shapers include:

- Operators must wear eye protection.
- The cutting heads of wood shapers must be enclosed with a cage or adjustable guard;
- Knives must be of the best shaper steel and set by fully qualified installers;
- Knives and the grooves in the collars must fit perfectly and be free of dust;
- Knives must not be used after they are worn down to the middle point of the collar. Knives must be balanced perfectly;
- Operators should avoid deep cuts and should start the work in short starts and stops, bringing the spindle up to operating speed slowly. The operator should listen for any evidence that the knives are out of balance;
- There should be a braking device on the shaper to stop the spindle after the power is shut off;
- Only a long-handled brush should be used to remove chips and dust from the blades;
- Shaper work should be held against guide pins or a fence.

Planers

General regulations for the use of power-fed planers include:

- Operators and assistants must wear eye protection and dust respirators. It is recommended that hearing protection if the planer is not sound insulated.
- Cutter heads must be completely enclosed in solid metal guards which should be kept closed when the planer is running;
- All belts and pulleys should be completely enclosed on the backside of the planer;
- Feed rolls must be guarded by a wide metal strip or bar keeping operator's fingers out of the rolls while allowing boards to pass. Sectional kickback finger devices must be provided in lieu of feed rolls;
- The operator should stand out of the way of board travel.

Appendix D
Safety Checklist for Machine Guarding

SAFETY CHECKLIST FOR MACHINE GUARDING

The following checklist is intended to assist supervisors and/or workers to determine if machinery and machine guarding are required, if such protection readily available and is it properly used. Any no answers should cause the supervisor/worker to initiate corrective action. Reference OSHA Standards 1910.211-219.

General Requirements	Yes	No
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Electrical Power/Controls		
Is each machine equipped with a master switch that can be locked and tagged during repair or maintenance operations?	<input type="checkbox"/>	<input type="checkbox"/>
Are power controls and operating controls located within easy reach of the operator at his/her regular workstation?	<input type="checkbox"/>	<input type="checkbox"/>
Are controls brightly marked and easily identified allowing the operator to cut off power at the point of operation?	<input type="checkbox"/>	<input type="checkbox"/>
Is each machine provided with an appropriate electrical ground?	<input type="checkbox"/>	<input type="checkbox"/>
Is a trip device provided on machinery on which injury might result if motors were to inadvertently restart after power failures?	<input type="checkbox"/>	<input type="checkbox"/>
Are main "kill" switches centrally located, easily identified, and accessible to shop supervisors or co-workers for use in interrupting power in emergency situations?	<input type="checkbox"/>	<input type="checkbox"/>

Personal Protective Equipment		
Is appropriate eye protection provided to, and its use required by, operators and assistants where the operation of the machine may produce flying objects or dust?	<input type="checkbox"/>	<input type="checkbox"/>
Is appropriate hearing protection provided to, and its use required by, operators and helpers, who must work around equipment which may emit noise levels above 85 dBA (see the TU Hearing Conservation Program)	<input type="checkbox"/>	<input type="checkbox"/>
Is the wearing of loose fitting clothing or neckties prohibited for employees who operate shop equipment?	<input type="checkbox"/>	<input type="checkbox"/>
Is the wearing of gloves, rings, neck chains and other hazardous jewelry prohibited of employees who operate or work on machines with working parts?	<input type="checkbox"/>	<input type="checkbox"/>
Are employees with long hair required to keep the hair restrained while working around machinery with moving parts?	<input type="checkbox"/>	<input type="checkbox"/>

Housekeeping		
Are appropriate brushes provided to employees working at machines that produce slivers, sawdust, and other debris?	<input type="checkbox"/>	<input type="checkbox"/>
Are operators instructed to never clean their machines or the surrounding area with bare hands?	<input type="checkbox"/>	<input type="checkbox"/>
Are operators instructed to never clean their machines while they are operating?	<input type="checkbox"/>	<input type="checkbox"/>

Is compressed air allowed for cleaning ONLY where it can be reduced to 30 P.S.I.? Does the supervisor enforce such reduction?	<input type="checkbox"/>	<input type="checkbox"/>
Is eye protection provided and its use required where compressed air is used for cleaning operations?	<input type="checkbox"/>	<input type="checkbox"/>
Are oily rags, waste, and other materials saturated with combustible substances disposed of in approved metal containers with self-closing lids?	<input type="checkbox"/>	<input type="checkbox"/>
Are such containers clearly marked for disposal of combustible materials and emptied on a daily basis?	<input type="checkbox"/>	<input type="checkbox"/>
Are local exhausts installed on machines that produce large amounts of dust, sawdust, or other fine debris?	<input type="checkbox"/>	<input type="checkbox"/>
Is a safety zone established and well marked around each machine?	<input type="checkbox"/>	<input type="checkbox"/>

<i>Lockout and Tagging</i>		
Is each machine completely shut down and the control switch locked and tagged by the LOTO trained person performing maintenance, prior to any maintenance attempt?	<input type="checkbox"/>	<input type="checkbox"/>

<i>Training</i>		
Are only personnel/students who are thoroughly trained in the operation of a machine allowed to operate machinery?	<input type="checkbox"/>	<input type="checkbox"/>
Does the supervisor/instructor constantly observe shop practices to ensure that all safety regulations are being observed?	<input type="checkbox"/>	<input type="checkbox"/>
When unsafe acts are noted, does the supervisor/instructor ensure they are corrected and that they do not recur?	<input type="checkbox"/>	<input type="checkbox"/>

<i>Machines used for both Wood-Working and Metal-Working</i>		
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<i>Buffing and Wire Brushing Wheels</i>		
Is a work rest present?	<input type="checkbox"/>	<input type="checkbox"/>
Is the work rest less than 1/8" from the wheel?	<input type="checkbox"/>	<input type="checkbox"/>
Are goggles or face shields and leather gloves provided and their use required by employees operating wire-brushing wheels?	<input type="checkbox"/>	<input type="checkbox"/>

<i>Abrasive Wheel Equipment Grinders</i>		
Do side guards cover the spindle, nut and flange and 75% of the wheel diameter?	<input type="checkbox"/>	<input type="checkbox"/>
Is the work rest used and kept adjusted to within 1/8-inch (0.3175cm) of the wheel?	<input type="checkbox"/>	<input type="checkbox"/>
Is the adjustable tongue guard on the top side of the grinder used and kept to within 1/4-inch (0.6350cm) of the wheel?	<input type="checkbox"/>	<input type="checkbox"/>
Is the maximum RPM rating of each abrasive wheel compatible with the RPM rating of the grinder motor?	<input type="checkbox"/>	<input type="checkbox"/>
Before new abrasive wheels are mounted, are they visually inspected and ring tested?	<input type="checkbox"/>	<input type="checkbox"/>
Is cleanliness maintained around grinders?	<input type="checkbox"/>	<input type="checkbox"/>
Are dust collectors and powered exhausts provided on grinders used in operations that produce large amounts of dust?	<input type="checkbox"/>	<input type="checkbox"/>

Are goggles or face shields always worn when grinding?	<input type="checkbox"/>	<input type="checkbox"/>
Are bench and pedestal grinders permanently mounted?	<input type="checkbox"/>	<input type="checkbox"/>
Is each electrically operated grinder effectively grounded?	<input type="checkbox"/>	<input type="checkbox"/>
Are fixed or permanently mounted grinders connected to their electrical supply system with metallic conduit or other permanent method?	<input type="checkbox"/>	<input type="checkbox"/>
Does each grinder have an individual on and off control switch?	<input type="checkbox"/>	<input type="checkbox"/>

<i>Drill Presses</i>		
Is it required that all stock be properly secured to the press to prevent accidental movement during drilling?	<input type="checkbox"/>	<input type="checkbox"/>
Are operators prohibited from making measurements near the tool, reaching across the table or adjusting the machine or stock while the machine is in motion?	<input type="checkbox"/>	<input type="checkbox"/>
Are all power transmission parts effectively guarded?	<input type="checkbox"/>	<input type="checkbox"/>
Is a spring-safety guard provided to guard the drill bit and to catch metal slivers and wood chips?	<input type="checkbox"/>	<input type="checkbox"/>

<i>Lathes</i>		
Is each exposed power transmission part effectively guarded for complete operator protection?	<input type="checkbox"/>	<input type="checkbox"/>
Note: If a supervisor or operator has reason to believe that a machine may not be effectively guarded, consult Environmental Health and Safety.		
Are operators instructed to avoid taking deep cuts when working with wood to avoid the cutting tool's being forcibly ejected?	<input type="checkbox"/>	<input type="checkbox"/>
Are operators prohibited from measuring or calibrating while the lathe is in motion?	<input type="checkbox"/>	<input type="checkbox"/>
Are all cutting heads covered as completely as possible by metal hoods or shields?	<input type="checkbox"/>	<input type="checkbox"/>
Are guards designed in such a manner as to allow easy access to make adjustment to the stock or cutting head?	<input type="checkbox"/>	<input type="checkbox"/>
Where an exhaust system is used, does the metal guard form part or all of the exhaust hood?	<input type="checkbox"/>	<input type="checkbox"/>

<i>Metal-Working Machines</i>

<i>Milling Machines</i>		
Are shims, blocks and clamps provided to hold stock in place?	<input type="checkbox"/>	<input type="checkbox"/>
Are adjustments to the speed of the machine, the rate of feed or coolant flow, or other function prohibited while the machine is in operation?	<input type="checkbox"/>	<input type="checkbox"/>
Are machine equipped with hand-adjusting wheels, mounted on the shaft by clutches or ratchet devices, so that the wheels do not revolve when the automatic feed is in use?	<input type="checkbox"/>	<input type="checkbox"/>
Do horizontal machines have a splash guard and pans for catching thrown cutting lubricant and lubricant running from the tools?	<input type="checkbox"/>	<input type="checkbox"/>
Is the placing of hand tools on the worktable prohibited at all times?	<input type="checkbox"/>	<input type="checkbox"/>
Are operators prohibited from reaching around cutters to remove metal chips or debris?	<input type="checkbox"/>	<input type="checkbox"/>

Are brushes provided and their use required for cleaning the machines?	<input type="checkbox"/>	<input type="checkbox"/>
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<i>Wood-Working Machines</i>

<i>Band Saws</i>

Is the cutting edge of the blade completely enclosed by an adjustable guard, except at the point of operation?	<input type="checkbox"/>	<input type="checkbox"/>
Are both upper and lower drive wheels completely enclosed by solid metal, woven wire mesh or expanded sheet metal and securely fastened to the metal framework?	<input type="checkbox"/>	<input type="checkbox"/>
Is each saw provided with a tension control device to ensure proper operating tension at all times?	<input type="checkbox"/>	<input type="checkbox"/>
Are effective brakes provided to stop the wheel in the event of blade breakage?	<input type="checkbox"/>	<input type="checkbox"/>

<i>Circular Saws</i>

Are table saws equipped with a guard that protects the portion of the saw above the table?	<input type="checkbox"/>	<input type="checkbox"/>
Does the guard automatically adjust itself to the thickness of the material being cut in order to provide continuous protection from the blade?	<input type="checkbox"/>	<input type="checkbox"/>
Are table saws (unless self-fed with rollers or a wheel in the back of the saw) provided with a spreader fastened securely behind the saw?	<input type="checkbox"/>	<input type="checkbox"/>
Are circular rip saws provided with sectional non-kickback fingers or dogs?	<input type="checkbox"/>	<input type="checkbox"/>
Is the part of the saw blade underneath the table completely enclosed?	<input type="checkbox"/>	<input type="checkbox"/>
Is it required that stock be held against a gauge, never sawed freehand?	<input type="checkbox"/>	<input type="checkbox"/>
Is the operator required to stand out of the line of the stock he is ripping to avoid being injured by kickbacks?	<input type="checkbox"/>	<input type="checkbox"/>
Are operators required to stop the saw completely prior to leaving it?	<input type="checkbox"/>	<input type="checkbox"/>

<i>Radial Arm Saws</i>

Are radial saws designed to return gradually and automatically to the starting position when released by the operator?	<input type="checkbox"/>	<input type="checkbox"/>
Is the table wide enough so that the saw does not extend over the table when pulled to capacity?	<input type="checkbox"/>	<input type="checkbox"/>
Is the "Do Not Rip or Plough from This End" sticker present?	<input type="checkbox"/>	<input type="checkbox"/>
Is the blade rotation marked?	<input type="checkbox"/>	<input type="checkbox"/>
Are blade guards/rings present?	<input type="checkbox"/>	<input type="checkbox"/>

<i>Sanding Machines</i>

Are dust respirators provided and their use required by those operating the machine or who must stand in close proximity of the operation and when cleaning up?	<input type="checkbox"/>	<input type="checkbox"/>
Do belt sanders have guards placed at each in-running nip point on the power transmission and feed roll parts?	<input type="checkbox"/>	<input type="checkbox"/>
Is the unused run of the sanding belt guarded?	<input type="checkbox"/>	<input type="checkbox"/>
Do manually fed sanders have a work rest to be used by the operator to properly support the work?	<input type="checkbox"/>	<input type="checkbox"/>

Are sanding belts the same width as the pulley-drum, are they free of cracks and badly worn spots and frays, and are they adjusted tightly against the pulley-drum before each use?	<input type="checkbox"/>	<input type="checkbox"/>
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Jointers		
Is the jointer blade guarded as work is fed into it?	<input type="checkbox"/>	<input type="checkbox"/>
Note: A guard which adjusts itself covering the table on the working side of the gage is recommended. The unused end of the gage should be enclosed at all times.		
Are push blocks provided and their use required when performing surfacing work or when jointing short pieces of stock?	<input type="checkbox"/>	<input type="checkbox"/>
Is the opening between the table and the knife just large enough to clear the knife?	<input type="checkbox"/>	<input type="checkbox"/>
Is the clearance between the edge of the rear table and the cutter head not more than 1/8 inch?	<input type="checkbox"/>	<input type="checkbox"/>
Is the table throat opening not more than 2 1/2 inches, when tables are set with each other for zero cut?	<input type="checkbox"/>	<input type="checkbox"/>

Wood Shapers		
Are the cutting heads of wood shapers enclosed with a cage or adjustable guard?	<input type="checkbox"/>	<input type="checkbox"/>
Is there a braking device on the shaper to stop the spindle after the power is shut off?	<input type="checkbox"/>	<input type="checkbox"/>
Is it required that shaper work be held against guide pins or a fence?	<input type="checkbox"/>	<input type="checkbox"/>

Planers		
If the planer is not sound insulated, is hearing protection provided and its use required in accordance with the TU Hearing Conservation Program?	<input type="checkbox"/>	<input type="checkbox"/>
Are cutter heads completely enclosed in solid metal guards, which should be kept closed when the planer is running?	<input type="checkbox"/>	<input type="checkbox"/>
Are all belts and pulleys completely enclosed on the backside of the planer?	<input type="checkbox"/>	<input type="checkbox"/>
Are feed rolls guarded by a wide metal strip or bar to keep the operator's fingers out of the rolls while allowing boards to pass?	<input type="checkbox"/>	<input type="checkbox"/>

Appendix E
OSHA Machine & Machine Guarding Standard
29 CFR 1910.211-119

1910 Subpart O – Machinery & Machine Guarding:

http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10131

1910.211:

http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9835

1910.212:

http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9836

1910.213:

http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9837

1910.214:

http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9838

1910.215:

http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9839

1910.216:

http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9840

1910.217:

http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9841

1910.217 Appendix A:

http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9842

1910.217 Appendix B:

http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9843

1910.217 Appendix C:

http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9844

1910.217 Appendix D:

http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9845

1910.218:

http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9846

1910.219:

http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9847