

Hazardous Energy Control Program

Policy

It is the policy of Michigan Technological University that all equipment be locked out during servicing and/or maintenance work to protect against accidental or inadvertent activation which could result in personal injury or equipment damage. In addition to disconnecting the power source, it is also required that all residual pressures be relieved and energizing lines closed prior to and during any such work.

Purpose and Scope

This policy establishes the minimum requirements for the lockout of energy sources whenever maintenance or servicing work is done on machines or equipment. It shall be used to ensure that the machine or equipment is stopped, isolated from all potentially hazardous energy sources, and locked out before employees or students perform any servicing or maintenance work where the unexpected energization or start-up of the machine or equipment, or release of stored energy could cause injury.

Definitions

Affected Employee. An employee whose job requires him/her to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout, or whose job requires him/her to work in an area in which such servicing or maintenance is being performed.

Authorized Employee. A person who locks out machines or equipment in order to perform servicing or maintenance on that machine or equipment. An affected employee becomes an authorized employee when that employee's duties include performing servicing or maintenance covered under this section.

Responsibility

All employees and students (authorized, affected, or others) are required to comply with the requirements of lockout. The authorized employees are required to perform the lockout following this procedure. All students and employees, upon observing a machine or piece of equipment is locked out for servicing or maintenance work, shall not attempt to start, energize or use that machine or equipment. Employees and students shall consult with supervision or Occupational Safety and Health Services whenever there are any questions regarding energy control procedures or methods. Supervision/management shall enforce the energy control procedure including the use of corrective disciplinary action when necessary.

Application

1. Obtaining a Lock and Identification Label

Authorized employees shall be issued a lock from their supervisor as their personal safety lock. Safety locks used for personal protection will be individually numbered, keyed padlocks, and blue in color. One key will be in the possession of the employee using the safety lockout lock. The other key or a master key will be maintained by supervision/management in a lock box in the main

department office for emergency lock removal as established in the energy control procedure.

Personal safety locks (blue) used for energy control shall have a durable tag attached that indicates a lockout condition and the name of the employee who attached the safety lock and the date and time applied. Supervisor safety locks shall be red.

Personal safety locks are for the personal protection of employees and are to be used solely for the control of hazardous energy sources (power lockout).

2. What to Lock Out

During servicing or maintenance, a machine utilizing any mechanical power source such as electrical, pneumatic, steam, or hydraulic must be locked out when the unexpected energization or startup of the machine or equipment or release of stored energy could cause injury to employees. The lockout must render the machine inoperative and immovable.

3. When Lockout Methods Are Required

- **Equipment Cleaning or Jam-clearing Tasks** - When a normally moving piece of equipment is stopped for cleaning, clearing, or adjustment during which a startup could cause injury, lockout is used.
- **Equipment Repair** - Whenever a repair is being performed on or near equipment where there is a possibility of injury as a result of starting the equipment, lockout is used. This includes any and all equipment from which a guard or other safety device has been removed.
- **Installation Tasks** - Frequently during installation, either part or all of the components making up the installation can be operated before the installation is complete. If needed for testing, precautions must be taken to prevent injuries to personnel during the test periods and the equipment again locked out when the test is complete or interrupted.
- **Electrical Repair Tasks** - Whenever any work other than testing is to be performed on an electrical circuit, the wiring involved must be deactivated and locked out so that it cannot be reactivated during this work.

4. Group Lockout

Before the work begins, the lockout procedure will be reviewed with each group member. One authorized employee will be designated as responsible for the lockout.

If more than one department, shift, etc, is involved, one authorized employee will coordinate the lockout to ensure that all control measures are applied and that there is continuity of protection for the group.

Each authorized employee will affix a personal safety lock to the group lockout device and will remove their lock when she/he stops working on the machine or equipment. Each lock must have

that person's name affixed to it.

5. Shift Changes

The continuity of machine safeguarding during shift or personnel changes or during long intervals of time between work will be accomplished through the use of a red supervisor lock. Prior to shift change the supervisor will install a supervisor lock to the lockout adapter prior to removal of personal safety locks unless the equipment is ready to go back into service. A tag indicating the status of the machine/equipment will be attached to the supervisor lock.

Supervisor locks shall be red in color and will be used to lock out machines/equipment during shift changes or to maintain machines/equipment off line and to prevent unintentional operation.

Supervisor locks (red) are not to be used as energy control devices for personal protection. Supervisor locks will be applied and removed by supervisory management personnel.

6. When Lockout Methods Are Not Required

- Minor tool changes (for example, changing a drill bit) are not covered when a stop button is used to control unexpected motion during the tool change or minor adjustment and when the start button is both visible and under the employee's immediate control.
- Other minor servicing activities that take place during normal production operations are not covered by this standard if they are routine, repetitive, and integral to the use of equipment for production and if work is performed using alternative protective measures that provide effective employee protection.
- Cord and plug connected equipment must be unplugged and under the exclusive control of the employee performing the service or maintenance work. The plug must physically be in the possession of the employee, or in arm's reach and in the line of sight of the employee. Lockout devices are available to lock out the plug when disconnected if these conditions can not be met.
- Repair, trouble-shooting and set-up adjustments must be performed on energized equipment only when it is absolutely necessary to leave the machine energized. For the purpose of this procedure, the trouble-shooting process will end and a lockout will be required whenever:
 - ▶ Power is shut off.
 - ▶ A particular problem has been located and repairs start.
 - ▶ Circuit changes are being made.

Procedures

1. Application of Lockout Control

Each department chair/director/manager shall be responsible for developing written lockout procedures for the machines and equipment under their control or ownership, which require such

procedures. The written procedure shall meet all of the requirements of MIOSHA Part 85 c(4)(ii).

Cord and plug connected electrical equipment, for which exposure to the hazards of unexpected energization or startup of the equipment is controlled by the unplugging of the equipment from the energy source, is exempt from the written procedure and lockout requirement provided that the unplugged cord is under the exclusive control (the plug must be within sight or three feet of the employee at all times during the work) of the employee(s) conducting the service or maintenance activities. A written procedure is also not required when a piece of equipment has only a single source of energy which can be readily identified and isolated provided that: when locked out with a single locking device, the equipment will be completely de-energized and deactivated, the lockout device is in the exclusive control of the authorized employee performing the work, the work does not create a hazard for other employees, and MTU has had no accidents involving unexpected energization or activation of the equipment.

- A. **Preparation for Shutdown** - Personal safety locks and keys will be kept by each individual operator, mechanic, electrician. Supervisors will also have their own locks and keys. Authorized employees shall review the written lockout procedure to have complete understanding of the type(s) and magnitude of the energy, the hazards of the energy to be controlled, and the methods or means to control the energy.
- B. **Notification of Employees** - Affected employees shall be notified by the authorized employees that the machine or equipment is going to be locked out.
- C. **Machine or Equipment Shutdown** - The machine or equipment shall be turned off or shut down using the energy control procedures established for the machine or equipment.
- D. **Machine or Equipment Isolation** - All energy isolating controls that are needed to control the energy of the machine or equipment shall be physically located and operated in such a manner as to isolate the machine or equipment from the energy sources (e.g., steam, pneumatic, hydraulic). A Zero Energy State must be proven. If the valves do not permit the use of a standard lockout, another method such as wire cable and lock can be used. When gravity is a source of hazardous energy the affected component must be physically blocked to isolate the hazard.
- E. **Lockout Device Application** - The multiple lock adapter and lock shall be affixed in such a manner as to hold the energy isolation devices in a safe or off position.
- F. **Notification of Affected Personnel** - Affected employees shall be notified by the authorized employees that the machine or equipment is locked out. In addition to verbal notification, a sign indicating a power lockout condition will be placed near the machine/equipment controls.
- G. **Verification of Isolation** - Prior to starting work on a machine or equipment that has been locked out, each authorized employee involved shall verify that the isolation and de-

energization of the machine or equipment have been accomplished by testing the effectiveness of the lockout by attempting to cycle the machine or start the equipment at the motor control center panel or start/stop switch.

Each authorized employee will notify other authorized and affected personnel in the area that they are going to attempt to cycle the machine or equipment prior to doing so and shall ensure that personnel are free and clear of the machine or equipment prior to operating the controls.

If the controls activate the machine or equipment or cause any machine or equipment movement, each authorized employee will begin again at step A, Preparation for Shutdown.

If there is the possibility of re-accumulation of stored energy to a hazardous level, verification or isolation shall be continued until the servicing or maintenance is completed, or until the possibility of re-accumulation no longer exists. Stored or potential energy will be relieved, restrained, or otherwise made safe.

H. **Begin Work Activity** - Work activity will begin once each authorized employee involved has verified that the current control of hazardous energy sources has been effective.

2. **Testing/Positioning of Machines/Equipment/Components**

In situations in which lockout devices must be removed from the energy isolating device and the machine or equipment energized to test or position the machine, equipment or component, the following sequence of actions shall be followed:

- A. Clear the machine or equipment of tools and materials.
- B. Remove employees from the machine or equipment area.
- C. Notify affected employees that the lockout devices are going to be removed.
- D. Each authorized employee who applied a safety lock will remove their own safety lock.
- E. Notify affected employees that the safety locks have been removed and that the machine or equipment is going to be energized.
- F. Energize and test the equipment.
- G. De-energize all systems and reapply energy control measures in accordance with established procedures.

3. **Lock Removal**

Each lockout lock shall be removed from each energy isolating device by the authorized employee who applied the device except for conditions specified in Emergency Lock Removal. A lockout must never be broken (lock removed) by anyone other than the employee who performed that

lockout.

4. Emergency Lock Removal

When an authorized employee is not available to remove their lock, the supervisor of that employee has the authority to request the removal of a lock in the absence of the employee. In those cases when a supervisor exercises that authority, the following procedure must be followed:

- A. The supervisor shall contact an authorized person and request assistance in this procedure.
- B. The supervisor and an authorized person must attempt to contact the employee to whom the lock belongs and determine if the employee is on the premises. Efforts to locate the employee shall include checking with coworkers, checking the parking lot for their vehicle, and calling their home and cell phones.
- C. If the employee is on the premises, she/he alone has the authority to determine whether the lock can be removed based on the guidelines of the lockout procedure.
- D. If the employee is not on the premises, the supervisor or an authorized person will make a reasonable effort to contact the employee and will ask the employee whether the work is complete and the equipment is ready to be activated. The employee will be advised that his/her lock will be removed.
- E. If the employee advises that the equipment is not ready to be activated, the supervisor must arrange to have another lock placed on the equipment as soon as the existing lock is removed.
- F. If the employee advises that the equipment is ready to be activated, the supervisor shall inspect the work area to verify that there is no danger in re-energizing the equipment, remove the lock, and inform the department management that the equipment is operational.
- G. If contact is not established, the supervisor will inspect the equipment for completeness of work and authorize the removal of the lock. The employee whose safety lock has been removed will be notified of the removal in person by the supervisor immediately upon the employee's return to work.
- H. If the equipment is ready to be activated, the supervisor will inform the department management that the equipment is operational. At this point, the supervisor can authorize removal of the lock.

The person removing the safety lock is responsible for making certain that all requirements for restoring power are followed prior to removing the safety lock.

5. Lockout Devices

The following types of lockout devices are authorized for use at Michigan Technological University:

- **Electrical disconnect or breaker lockout device** - the switch lever must be padlocked in the OFF position using a shackle and/or padlock with an identification label.
- **Valve lockout device** - may be locked out by using a padlock, a cable and lock, or a valve handle lockout device. The method used is determined by the type of valve.
- **Line blinds or “pancakes”** - to isolate the time flow of fluid or gases in piping systems. To be used in conjunction with pipe breaking procedures.
- **Multiple locks (gang hasp)** - when more than one person or group has to work on a machine, a lock adapter shall be used. Each person or group must place a lock on the adapter, thus assuring each person a safe and complete lockout. It is important that during a shift change, locks be left in place until the time that the next crew is present and have placed their locks on the adapter.

Training Requirements

1. Categories of Employee Training

- **Authorized employees** will receive training in the recognition of applicable hazardous energy sources, the type and magnitude of the energy available in the work place, and the methods and means necessary for the energy isolations and control. An employee will not be considered authorized until training has been completed.
- **Affected employees** shall be instructed in the purpose and use of the energy control procedure.
- **“Other” employees** whose work operations are, or may be, in an area where energy control procedures may be utilized shall be instructed about the procedure, and about their responsibility not to restart or re-energize machines or equipment which are locked out.

2. Employee Retraining

Retraining shall be provided for all authorized and affected employees whenever there is a change in their job assignments, a change in machines, equipment or processes that present a new hazard, or when there is a change in the energy control procedures.

Additional retraining shall also be conducted whenever periodic inspection reveals, or whenever there is reason to believe, that there are deviations from or inadequacies in the employee’s knowledge or use of the energy control procedures.

Retraining will re-establish employee proficiency and introduce new or revised control methods and procedures, as necessary.

3. Certifying Training/Retraining

Each department shall appoint a representative to certify that employee training/retraining has been accomplished and is being kept up to date. Certification shall include written documentation containing the employee's name, category status (authorized, affected, other), and dates of training as well as a signed statement by the supervisor signifying that the training has been conducted. Certification shall be done annually.

Periodic Inspection

1. Inspection

Inspections of authorized employees performing the energy control measures described in this program shall be performed at least annually, and records kept on this inspection. This inspection will be performed by an authorized employee.

The authorized employee conducting the inspection will observe the actual implementation of the procedure. The inspection shall also include a review of the employee's responsibilities under the energy control procedure.

Documentation should include employee names, dates of inspection, and the written procedure used during this lockout.

2. Inspection Documentation

The authorized employee conducting the periodic inspection shall certify that such inspection has been conducted. Certification shall include written documentation that identifies the machine or equipment on which the energy control procedure was being utilized, the employees included in the inspection, any deviations or inadequacies in the employee's knowledge or use of energy control procedures identified, the name of the authorized person performing the inspection, the date of the inspection, and a signed statement by the authorized employee conducting the inspection.

Contractors

All outside contractors are required to provide a copy of their written lockout program and training documentation or comply with this procedure (including employee training) while performing work for Michigan Technological University requiring lockout. Contractors will coordinate all lockout activities and procedures with the project engineer or manager before work begins.