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## Hazardous Energy Control for the 21st Century

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### Purpose of Energy Control

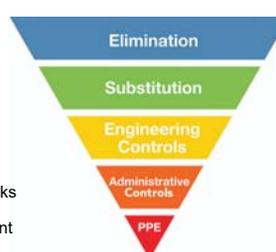


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### Purpose of Energy Control

- Lockout Tagout (LOTO) Lockout Tagout is designed to prevent incidents and injuries associated with the unexpected start up of equipment or release of hazardous energy sources during servicing and maintenance activities
- LOTO is the process of the authorized placement and **administrative control** of locks and tags used to ensure the protection of employees, equipment, and the environment



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### Purpose of Energy Control

*Administrative Controls Can Fail*



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### OSHA 29 CFR 1910.147

- The current LOTO standard was published in 1989
- It requires that all sources of energy be controlled during servicing and maintenance of machines and equipment using an energy-isolating device
- During the development of 1910.147 OSHA made decisions that altered or added to the intent of the content and meaning of various provisions of Z244.1 standard it was based on
- One critical decision involved the eventual interpretation and enforcement of the following sentence:
  - “Push buttons, selector switches and other control circuit devices are not energy isolating devices”

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### Energy Isolation Devices

*E-stops and Circuit Control Systems For LOTO*

- As a result, reliance on a PLC system that controls machine or equipment safety functions, such as stopping or preventing hazardous energy (motion), or E-stop is prohibited as a form of energy control



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### LOTO Feasibility

- There are many situations where traditional LOTO is not feasible and has caused friction between EHS professionals and employees expected to perform the tasks
- Examples include:
  - Aligning in-fed product
  - Adjusting robotic sensors
  - Clearing jams
  - Operational set ups
  - Basic cleaning




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### Minor Servicing Exemptions

Per OSHA 1910.147(a)(2)(ii)

- LOTO is not required when performing minor maintenance or servicing activities, provided such activities:
  - Are performed during normal production operations;
  - Do not require the removal of a guard, disabling/bypassing of a safety device;
  - Do not require the placement of an employee's body into the point of operation or where a danger zone exists during a machine operating cycle;
  - Are routine, repetitive and integral to the use of the machine or equipment; and
  - Are performed using alternative protective measures that provide effective protection



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### Minor Servicing Exemptions

OSHA's Latest Interpretation - 2008

**Question:** With regard to the minor servicing exception [contained in §1910.147(a)(2)(ii) note], would the described PLC system meet the definition of an *alternative measure which provides effective protection*?

**Reply:** Circuit control systems, such as the PLC system you describe, are not energy isolating devices as defined at §1910.147(b). As a result, reliance on a PLC system that controls machine or equipment safety functions, such as stopping or preventing hazardous energy (motion), is prohibited by the LOTO standard and, as a result, is presumed to be ineffective employee protection from injuries resulting from hazards such as **component failure, program errors, magnetic field interference, electrical surges, and improper use or maintenance.**



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### Minor Servicing Exemptions

OSHA's Latest Interpretation - 2008

However, if an employer can demonstrate that a PLC system is an *alternative measure which provides effective protection*, the PLC system may be used **only** to protect employees who are performing minor tool changes and adjustments, and other minor servicing activities...

To meet this exception, an employer must demonstrate that there is *effective* employee protection, through the use of a system hazard analysis, before OSHA would accept PLCs for minor servicing activity covered in the equipment-specific analysis.



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### Machine Safety Improvements

**1989!**

- In 1989, the OSHA position was to exclude all control systems as a means to control energy
- Early electronic control systems were generally not reliable enough to prevent the unexpected energization or release of stored energy unless they were specifically designed for that purpose
- Advances in control system technologies in the past 30 years have provided improvements in safety and productivity for machinery, equipment and processes




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### Machine Safety Improvements

- The nature of lockout/tagout has also significantly advanced since the OSHA standard was drafted
- While the traditional control of hazardous energy has relied on locking out an energy isolating device, advances in control systems now allow for Alternative Methods to control hazardous energy
- These alternative methods allow for solutions that are as safe or safer than traditional lockout consistent with the hazard control hierarchy




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### ANSI Z244.1 2016

Control of Hazardous Energy – Lockout/Tagout and Alternative Methods

- This standard exists to provide a reliable standard practice that, if followed correctly, can assure safety from hazardous energy in machinery
- The ANSI/ASSE Z244.1-2016 standard establishes guidelines for the control of hazardous energy associated with machinery, equipment, or processes that could do harm to the personnel
- Specifically, it does this by establishing lockout, tagout, or alternative methods to control the hazardous energy




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### OSHA Updates

- OSHA published a Request for Information (RFI) in May 2019 to get comments that would assist the agency in determining under what conditions control circuit type devices could safely be used for the control of hazardous energy
- “Technological advances since the standard was issued in 1989 suggest that, at least in some circumstances, control circuit type devices may be at least as safe as EIDs
- OSHA may consider changes to the Lockout/Tagout standard based on feedback



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### Developing Effective Protection Procedures

- Developing Effective Protection Procedures is a three-part process:
  1. Perform a Practicability (or Justification) Study of the task being performed
  2. Perform a Risk Assessment of the hazards and controls
  3. Documented Effective Protection Procedures



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### Risk Assessment

Per ANSI Z244.1

- The risk assessment is completed to determine that the techniques used will result in negligible risk of sudden startup
- The risk assessment process is generally a three-part process (Hazard identification, risk level determination and risk reduction)
- Z244.1 presents an abbreviated description of the risk assessment process and refers readers to ANSI B11.0 Safety of machinery for more detailed information




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### Effective Protection Procedures

- H&A has documented Effective Protection Procedure (EPPs) for many clients after risk assessments have been completed
- Procedures should identify at a minimum:
  - Specific applicable equipment;
  - Specific tasks that can be performed under the procedure;
  - Energy sources to be isolated and their control measures;
  - Safe work practices including special tools and areas to avoid; and
  - Limitations of the procedure (task that require full LOTO or another EPP).



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### Task Specific Effective Protection Procedure

Assigned Name: John Taylor (Date: 01/15/2017)	Equipment #: 11007
Client: L&L Tooling	Revision #: 1
Document #: EPP-11007	Revised Date: 12/1/2019

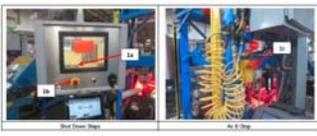
**General Notes:**  
This Effective Protection Procedure shall only be used in place of control circuit for minor tool changes, adjustments, and other minor servicing activities that are in their own right, nature and design in the use of the equipment for production, and all hazards of the activity are removed through alternative methods.

**Specific Tasks That Can Be Performed Under This Procedure:**

Task	Hazardous Energy	Protection Method and Safe Work Practices
Electric motor drives and moving equipment	Electric motor drives and moving equipment	2-step stop of electric energy sources, light curtains and interlocked gates provide secondary protection against startup
Manual grapples	Manual grapples	All 0-step release or process to grapples
Hydraulic drives	Hydraulic drives	2-step stop: hydraulic return, light curtains and interlocked gates provide secondary protection against startup

**Shutdown Steps:**

1. Lockout work
2. The machine equipment to normal production operation, follow these steps:
  - a. Check the area to ensure nobody is engaged
  - b. Remove all shields from machine
  - c. Pull out 0-step buttons
  - d. Repeat operations




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**Task Specific Effective Protection Procedures**

Equipment Name: *Turner Heavy Saw*      Equipment #/ID: *10000000000000000000*  
 Department: *Heavy Lifting*      Revision #: *1.0*

**WARNING!**  
 This Effective Protection Procedure shall only be used in strict adherence to the manufacturer's instructions, adjustments, and other safety warning activities. If they are repetitive, routine and integral to the use of the equipment for production, and all hazards of the activity are removed through alternative methods.

**Specific Tasks That Can Be Performed Under This Procedure:**

- Changeover - changing gear for different base size
- Adjusting tension
- **Never cut into or cut through a body member.**

**Steps To Achieve Effective Protection:**

1. Lockout and isolate the energy source according to the following instructions:
  - a. Pull out the stop button on front side of saw.
  - b. Push safety button on control panel.
  - c. Close interlock guard door.

**Assessing Energy      Protection Method and Safe Work Position:**

Verify energy equipment      To stop provide primary protection by stopping of electric energy source and mechanical movement, and locking parts. Interlock guard provides secondary protection against equipment start-up.

1. Perform work.

2. To return equipment to normal production operation, follow these steps:
 

- a. Remove key from lockout of equipment per safety instructions.
- b. Push out of stop button.
- c. Pull out of stop button.
- d. Restart operation.



Start Over Steps



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**Effective Protection Procedures**



- After procedures have been developed:
  - All employees must be trained to understand the purpose and differences of the LOTO and EPP procedures and the limitations of the EPPs
  - Employee evaluations are recommended be performed at least annually similar to LOTO procedures
  - Safeguarding used to provide effective protection must be tested regular and maintained



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**Integrating LOTO and Machine Safety**

- We expect Original Equipment Manufacturers to supply equipment that is "designed" to be safe and compliant with regulations but this is not always the case
- It is the responsibility of the employer to provide a safe work environment
- Maintenance operations and task that are routine, repetitive and integral to the use of the machine or equipment should always be considered when designing and installing new equipment
- If we follow the ANSI B11 and Z244 standards, we can provide a safe and productive work environment for all employees



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**Questions?**



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