

# Lockout in Mills



information guide

## WHAT YOU NEED TO KNOW

### The problem

Every year in Ontario, forestry workers are seriously injured or killed because machinery and equipment are not locked out and de-energized before routine maintenance, repairs, or troubleshooting. Workers have lost fingers and limbs. Some have suffered horrible burns or crushing injuries. Others have been electrocuted.

These horrible incidents can be prevented by effective lockout procedures that ensure the machine or equipment is disabled and any energy still present is dissipated before any obstructions are cleared or maintenance work is completed.

This guide is intended to provide information about controlling energy hazards workers are exposed to when conducting maintenance, repairs or troubleshooting on typical machines, equipment and work processes in forestry mills.

The guide describes procedures and requirements for the creation of a zero-energy state and lockout as the key hazard control measures to protect workers exposed to these hazards.

The guide covers the following topics:

- Types of energy in mills
- Knowing the machine or piece of equipment
- Safe operating procedure (SOP)
- Sample lockout procedure

### Types of energy

There are two main types of energy in forestry mills: potential and kinetic. Potential energy is energy that is waiting to be converted into power and kinetic energy is the energy of motion.

#### Potential energy

Potential energy is energy is stored in objects by the application of a force. Pressurized gas and hydraulic fluid are examples of potential energy. The bucket of a yard loader contains the potential energy of gravity. So does any load that's being suspended by a crane or other lifting device.

Pneumatic and hydraulic energy are the two main types of potential energy in mills.

#### Pneumatic Energy

Pneumatic (or air powered) systems store energy in the form of compressed air in a pressure tank and in the distribution lines. If the power to the compressor is turned off and locked out, the machines powered from the pneumatic lines will still operate as long as there is pressure in the system. This can be true days or weeks after the power is turned off. The way to achieve zero-energy state is to block the compressed air between the pressure tank and the machine or device being worked on (by closing and locking a valve) and releasing any pressure that remains by opening a pressure release valve to let the compressed air escape from the lines.

### Hydraulic energy

Hydraulically powered systems are very similar to pneumatic ones in their ability to store energy in the form of pressure.

The hydraulic system can store energy after the power supply to the hydraulic pump is turned off by moving hydraulic cylinders out of their neutral position where they exert back-pressure on the system. Stored hydraulic energy in extremely high-pressure hydraulic systems can cause machine components to move when you least expect it. Stored hydraulic energy can also cause the uncontrolled escape of hazardous fluid if the containment system is tampered with or springs a leak while still under pressure.

The way to ensure a zero-energy state with hydraulic systems consists of measures such as inserting blocks to immobilize moving parts and shutting off and locking out valves to isolate the machine or device. In cases where the hydraulic system itself is being serviced, it may also be necessary to bleed off any remaining pressure in the lines by actually opening a line and perhaps inserting a blank or plug at a joint to positively prevent movement of hydraulic fluid.

### Kinetic energy

Kinetic energy is motion energy – of waves, electrons, atoms, molecules, substances, and objects. Kinetic energy can be seen in rotating blades. The heavy weight and high speed of these sharp moving objects can freewheel or coast for several minutes after the machine has been shut down. Wait for these moving parts to come to a full stop before approaching them or before opening any guards, access panels or shields.

The three main types of kinetic energy in forestry are: electricity, mechanical motion, and thermal energy (heat).

### Electrical energy

Electrical energy needs to be locked out and tagged at the source – usually the MCC panel, but sometimes at the local disconnect.

### Mechanical motion

Mechanical motion hazards can occur in several areas on a machine or piece of equipment:

1. At the point of operation – the point at which the work is performed on the material (cutting, sawing, shaping, boring, shaving, chopping).
2. Along the power transmission apparatus – all components of the mechanical system that transmit energy to the part of the equipment performing the work. These components include such things as flywheels, pulleys, drive belts and chains, connecting rods, couplings, cranks and gears.
3. At other moving parts – including all parts of the machine or equipment that move while it is working. It can include any of the three types of mechanical motion. Examples include in-feed apparatus, conveyors, pistons, conveyance tables.

### Thermal energy

Heat is a form of energy that can often be stored in a machine or device after the power source is locked out. Some parts, like heaters and burners, can be expected to be hot; but other parts like bearings or electrical parts may become heated because of a malfunction and may surprise the worker who comes to investigate the problem. Wait until these areas cool down to a safe level and ensure that coolant pressures are eliminated before you start work in these areas.

## The Solutions

### **Know the machine or piece of equipment**

Each type of machine has its own unique operating features and maintenance requirements. That is why, from the very start, the operator or the mechanic must understand the requirements for the machine being worked on.

### **Before entering the danger zone**

A danger zone is any area where energy hazards exist. Before a worker enters a danger zone surrounding a machine, the machine must first be in a zero-energy state. Putting a machine or piece of equipment in a zero-energy state requires neutralizing any energy sources and isolating any energy sources. This can be done through following a complete lockout procedure each and every time a worker enters a danger zone.

### **Safe operating procedure (SOP)**

Safe operating procedures for proper machine lockout, and procedures for ensuring a zero-energy state in all energized systems, must be developed and followed to the letter each and every time a worker is exposed to these hazards. The procedures must be machine-specific. They must also be consistent with the requirements of the Occupational Health and Safety Act and Regulations.

Operators and millwrights must be properly trained in the operation of the machine, methods of repair and maintenance and all related hazards must be identified. Regular supervision by a competent supervisor is a key element in ensuring that everyone complies with the SOP requirements.

### **Lockout**

Lockout is the use of a lock or locks to put a machine or piece of equipment in a zero-energy state and prevent the machine or piece of equipment from being turned on inadvertently. The goal of lockout is to eliminate the possibility of a worker being exposed to hazardous energy. If there is no energy, the system or equipment is in a zero-energy state. To achieve this goal, ; involves two basic phases:

1. Isolation of all energy sources and
2. Neutralization of all stored energy sources.

The procedure and the lock itself (sometimes multiple locks) prevent an energy-isolating device (switch, breaker, fuse, valve, etc.) from deliberately or inadvertently being operated or turned on while workers are performing maintenance, repairs or troubleshooting on equipment or machines.

## The lockout procedure

Each lockout procedure needs to be machine-specific, because every machine is different. A lockout procedure should be created in cooperation with the joint health and safety committee or health and safety representative, the operators of the machine, mechanics or millwrights and members of management. This way, everyone understands the lockout procedure and nothing is missed when creating the procedure.

Although each procedure is machine-specific, there are several common elements to each procedure. The following steps apply to all general lockout procedures to protect workers from hazardous energy:

1. You turn the operating controls off and lock them in that position if possible.
2. You turn the power supply off. Stand beside the box – not in front – and put your hand on the on-off lever. Turn your face away and pull down the lever to shut off the power, then put a key-locking padlock on the electrical box to make sure that no one else can turn it back on. Scissors must be used whenever more than one person has to lock out at the same point. By using scissors, every worker can be sure that no one else can re-start or test the machine while someone is still in the danger zone. Attach a tag for information purposes. The tag can carry a work order number, the expected time of return to service or other information – but the tag must never substitute for a lock. Locking out the machine and tagging it as Do Not Operate or Lockout is an essential precaution against someone starting the machine while someone else is working on it. It also prevents an unattended machine from being put into use while undergoing repairs or maintenance that would jeopardize its safe operation.
3. You de-energize the system to deal with any electrical charge, moving parts or other energy that may still be present. This includes releasing pressure from hydraulic and pneumatic valves and inserting blanks, pins or blocks. It also includes ensuring that opto-electric beams cannot be activated by motion during the maintenance period.
4. After the power supply is turned off, you test the controls to make doubly sure that no energy is in the system. Also make sure that other sources of energy, for example hydraulic or pneumatic, have been neutralized.
5. After the work in the danger zone is finished, you secure the work area by removing blocks, replacing guards, picking up tools and inspecting the area.
  1. Any tools or materials have to be picked up
  2. Any blocking that was used has to be taken out
  3. And the work area has to be inspected to make sure that the machine can be safely started again.
6. You clear the danger zone and remove your lock or locks from the electrical box.
7. You turn the power on and return to the operator's control panel to test and restart the machine.

It's important that every step in this procedure be followed. Using your personal padlock will guarantee you that the machine and the power are off and that no one can start them again while you or anyone else is still in the danger zone.

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