

TerranearPMC Safety Share

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Several years ago, I worked as a loss control rep for a large insurance company. One day I was called to a factory that manufactured zippers. That's right, zippers. And the reason why I was called was to perform an accident investigation as one worker had about 70% of his left hand amputated. One of the processes is stitching a continuous length of zipper to fabric. Zippers were continuously fed into this rapid sewing process and occasionally, the fabric would get caught, causing the entire line to stop. Company procedures required that lockout-tagout measures are taken, which meant shutting down the line, turning off the power and ensuring that no one could inadvertently turn the power back on while a person performed maintenance on the process line. However, one worker decided that he could very quickly dislodge the fabric caught in the sewing machine. All he had to do was lie on his back, on the floor, and maneuver his arm through a maze of gears and other machine parts and grab the piece of fabric caught in the line and pull the cloth free. As you may have guessed, as soon as the worker tugged at the cloth and unjammed the machine, the entire process began with his hand still trapped. The employee thought he would be saving valuable time by bypassing certain safety precautions. However, instead of saving production time, the entire factory had to stop operations while emergency medical services responded.

Lockout-tagout (LOTO) or lock and tag is a safety procedure used in industry and research settings to ensure that machines are properly shut off and cannot be restarted prior to the completion of maintenance or repair work. It requires that hazardous energy sources be isolated and rendered inoperative before work is started on equipment. The isolated power sources are then locked, and a tag is placed on the lock identifying the worker who placed it. The worker then holds the key for the lock, ensuring that only he or she can remove the lock and start the machine. This prevents accidental startup of a machine while it is in a hazardous state or while a worker is in direct contact with it.

The Control of Hazardous Energy regulation was developed in 1982 by OSHA to help protect workers who routinely service equipment in the workplace. The regulation went into effect in 1989 and has since proven to be a valuable safety process, preventing countless injuries and deaths in the US workplace.

At the time of program implementation, most machines weren't designed to accept a padlock at the points of isolation. Local disconnects weren't always common; motor control center panels at times were the only way to shut off the electrical power, and they may not have been capable of being locked out. The tagout system, which provides only limited means of protection, may have been the only solution at times. In addition, the first lockout procedures were simple text-based procedures. Usually generic, thus providing limited information about how to properly shutdown and lockout equipment.

As lockout/tagout became more common and as employers saw the benefits of having an energy control program, procedures gradually got better. Machine-specific procedures were written with detailed shutdown steps and methods for verifying the effectiveness of the lockout.

LOTO processes are designed to shut down a machine while disconnecting it from any power source before beginning maintenance. However, sometimes, for any number of reasons, the LOTO process is not performed. In addition, there are certain types of equipment that are energized by multiple sources. In these cases, it is mandatory to identify all sources of energy and have them all shut down. A single



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switch is just one intermediate powering device and turning the switch to the “off” position is not equivalent to disconnecting the main power.

Shutting down a piece of equipment or cutting off the power supply does not necessarily mean the unit is safe to handle. Energy stored in batteries, excess pressure built up within a system, or having machines still hot from their previous run, as well as having pipes still containing hot or toxic liquids and gases, all need to be drained of residual substances – exposures to which – if not – controlled - can cause serious injuries and even death.

The OSHA regulation 29 CFR 1910.147 (c) (5) (ii) (c) (1) states that a tag must have an identification showing the name of the person doing the lock and tag. While this may be true in the US, it is not mandatory in Europe. The lockout can also be done by establishing responsibilities such as assigning a person as the shift leader. Using a "lockbox", the shift leader is always the last one to remove the lock and must verify it is safe to start up equipment.

Disconnecting or making equipment safe during maintenance, involves the removal of all energy sources and is known as isolation. The steps necessary to isolate equipment are often documented in an isolation procedure or a lockout tagout procedure. The isolation procedure generally includes the following tasks:

1. Announce shut off
2. Identify the energy source(s)
3. Isolate the energy source(s)
4. Lock and tag the energy source(s)
5. Prove that the equipment isolation is effective

This last step requires that the equipment switches are turned on to verify all energy sources have been completely de-energized. The locking and tagging of the isolation point is designed to inform others to not to de-isolate the device. To emphasize the last step, the entire process can be referred to as lock, tag, and try (that is, trying to turn on the isolated equipment to confirm it has been de-energized and cannot operate).

All too often, we think that LOTO applies to electrical sources and forget about the many other energy types that we need to be protected in the advent of machinery operation. Other types of energy include: hydraulic pressure, pneumatic pressure, string tension, steam, radiation – both ionizing and non-ionizing (LASERS) - and extremely hot liquids as well as cryogenic liquids. And, as illustrated in the event described in the beginning of this SafetyShare, moving parts, such as fans, belts, gears, saw blades, and presses cannot be ignored.

On many worksites, operations may involve contact with electric power lines and therefore, need to be shut off. However, these lines may service many businesses and by performing LOTO, these businesses may be impacted. As such, LOTO processes may require considerable investigation and cooperation of local utilities.

It is not our abilities that show what we truly are... it is our choices. Dumbledore, Harry Potter and the Chamber of Secrets

