How Proper Risk Assessment, LOTO/Alternative LOTO and Machine Guarding Contribute to Increased Production

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Costs of Accidents and Lockout

The cost of accidents to a facility is well documented in safety-related magazines. Most recently, the ASSE Risk Management specialty newsletter had an article, "The Accident Safety Iceberg & $afety Pays," detailing some of the underlying costs of accidents. These include machine downtime, lost production, worker health care costs, re-training employees if they can't return to that job function, and training a replacement while that person is out of work. Also included are the costs of lost productivity of other employees who are aware of the accident, but are unable to resume work because of uncertainty of the root causes of the accident and the safety of related equipment. Another factor that is pertinent, but was not explored in that article, is increased workers' compensation costs that can be incurred. OSHA has instituted the "$afety Pays" software program that addresses these issues and helps employers determine the true total cost of accidents, and thus establishes the financial value of avoiding them. The program then looks at the gross margin of the products and establishes how much more product must be sold to cover the cost of a potential accident.

This is an approach to safety that seeks to economically justify safety improvements. Previously, safety improvements have always been looked at simply as capital expenditures. The costs of the new devices and improvements were understood to improve safety, but it was difficult to economically justify the costs unless they addressed a specific incident that had already occurred, making the outlay a necessity.

OSHA Instruction CPL 02-00-147 from February 2008 is a directive to establish OSHA's enforcement policy for its standards addressing the control of hazardous energy. Section C CPL 02-00-147 states that "machine guarding often becomes an integral and essential component of an overall energy control procedure" and, many times, an important economical alternative to LOTO. It is interesting that OSHA mentions the economics of machine guarding. By examining the cost of minor servicing lockout to production versus the investment in machine safeguarding and improvements in production, a rate of return and payback on the investment in safeguarding devices can be determined.

What are the costs of lockout on production? The simple answer is that the machine and process are not running while lockout is occurring. The total time from when the machine is shut down until the machine is re-started is lost opportunity from production. Looking at this downtime and the dollar rate of production from the plant, one can determine the cost of the lockout. There is typically the upstream and downstream equipment to consider and the effect a shutdown would have on them. The processing material, of course, becomes of primary concern, as well as preventing the creation of unsalable product. Preventing production while producing scrap exasperates the costs involved. It is these potential total costs that must be used in evaluating the true cost of a lockout event. Any time savings that can occur by using alternative measures and machine guarding for minor servicing activities can provide a clear, measurable payback based on the production values.

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Requirements for Alternative Measures

So how does one determine what is minor servicing and what energy is hazardous? The OSHA directive section C continues, “An energy control procedure should be based upon a reliable hazard analysis that determines hazardous energy exposure so that hazards can be effectively controlled. This will provide effective employee protection during machine operation and component testing and positioning tasks, as well as during servicing and maintenance activities.”

The “reliable hazard analysis” is commonly referred to as a risk assessment. A risk assessment is required by nearly all new ANSI, CSA and ISO machine guarding–related standards.

Throughout the risk assessment, certain tasks and energy sources will reveal themselves to be potentially hazardous. The frequency of individual tasks will lead to the determination of what is routine, repetitive and integral to production. It will also reveal what exposure there is to potential hazardous energy. Certain tasks will prove to be routine but too hazardous to perform as designed unless lockout occurs. Risk reduction will address how to possibly make these tasks safer to perform using alternative measures. Additional considerations in the risk assessment are foreseeable misuse and failure modes.

While OSHA clearly recommends following a risk assessment procedure in order to determine the tasks and hazards that may be protected by alternative measures, and recommends machine guarding be used in lieu of lockout where appropriate, the OSHA directive takes exception to the safe-guarding hierarchy as presented in the B11.19. Specifically, it states, “The three other ANSI B11.19 safeguarding methods (awareness devices, safeguarding (work) methods, and safe work procedures) included in the 2003 standard, provide a lesser degree of employee protection and are considered to be secondary control measures during normal production operations. These methods, by design, do not prevent employees from placing or having any part of their bodies in the hazardous machine area.”

Section IV of the directive offers greater insight into the minor servicing exception and the level of safeguarding required. This level of safeguarding introduces the concept of control integrity that will work to address the potential failure modes of the devices and system. The control integrity of the system is increased based on using proven components, adding monitoring to verify that the device or system is functioning properly, adding redundancy, and adding the ability to prevent the loss of the safety function should a malfunction or multiple malfunctions occur within the device or system.

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OSHA concurs that control reliability of the safety system “would provide alternative safeguarding measures with respect to the minor servicing exception if these devices are under the exclusive control of the employee performing the minor servicing.” But OSHA stresses, “It is important to apply this safeguard through a hazard analysis process on a case-by-case basis in order to ensure that it, in fact, provides equivalent and effective employee protection.” This exclusive control is something that is critical to ensuring that the employee is in control of the safety system and someone cannot simply over-ride or remove this protection unknowingly.

Implementation

The steel industry in its various facets consists of process flow equipment covering a very large area. This equipment is difficult to guard, shutdown of the machinery is very infrequent, and shutdowns are not desired due to the effect on the entire process and the scrap potential. For these reasons, any events that interfere with production are critical to avoid. With this in mind, the production process needs to be examined as to how it meets the OSHA requirements and how improvements can be made that not only improve safety but also maintain productivity.

The process to do this is clear. Either standard lockout or alternative measures for things that are routine, repetitive and integral to production are required. Perform a task-based risk assessment, determine the potential hazards, determine the zones of control for the system, and address these hazards in ways that can improve the process. Alternative measures can be used by using reliable safety systems to isolate hazardous energy, so long as they provide effective protection.

Some ways to improve uptime for production-related activities include positioning the lockout devices in locations that prevent unnecessary commuting time between the lockout location and the work that is to be done. This locational lockout presents a great advantage with alternative solutions that offer multiple low-voltage lockout locations. This remote low-voltage lockout system is discussed in Annex G of the ANSI Z244.1-2003. “This technology uses a dedicated system of lockable dual-channel low-voltage safety switches located at multiple locations around a production machine to activate a lockout.” By positioning these devices at multiple locations, there can be lockout locations at all typical access points as determined in the risk assessment.

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The steel industry has a very high level of monitoring of processes and systems. High levels of process control allow insight to issues nearly immediately. New safety systems are being integrated within the process systems to improve both processes and safety. The current standards and directives do not put production ahead of safety, but the concerns of the manufacturing environment are recognized, as improvements are made to both safety and the bottom line.

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