

VIEWS ON THE CURRENT STATE OF CONTROLLING HAZARDOUS ENERGY

A Survey About the Control of Hazardous Energy

By Bruce Main and Alan Metelsky

“Under the industry standard ANSI/ASSP Z244.1, some tasks may be performed using an alternative method to control energy rather than locking out as per OSHA,” write Bruce Main and Alan Metelsky, authors of *Views on the Current State of Controlling Hazardous Energy: A Survey About the Control of Hazardous Energy*. In this excerpt from the report, they share results and analysis of a survey to assess the use of alternative methods.

As manufacturing becomes more complex and automation increases, safety practices must also evolve. For many years, a primary tenet of machinery safety has been “guard it or lockout/tagout (LOTO)” — a practice of completely isolating hazardous energy. Often, turning off and isolating all the power is the best solution to protect against unexpected startup of equipment. However, with advances in technology and design practices, alternative methods are being used throughout industries to provide effective protection. Alternative methods can be thought of as methods whereby energy is *controlled* as opposed to isolated. In many cases, alternative methods were borne of a need within industry to allow specific tasks to be done safely *without* powering down the entire system.

As U.S. industries, safety practitioners and OSHA grapple with the many considerations associated with implementing and using alternative methods in lieu of LOTO, one common thread continues to be a lack of understanding and information about the use of alternative methods. A survey consisting of 30 questions was conducted specifically to enhance the current state of understanding about the control of hazardous energy including the use of alternative methods. The survey yielded 276 responses from various industries and company sizes.

The primary purpose of the survey was to obtain ideas, thoughts, and comments on how to improve the control of hazardous energy and workplace safety. The equipment and facility design communities, as well as OSHA, can undoubtedly benefit from understanding the needs, concerns and influences of the control of hazardous energy on workplace safety. This survey was a channel to reach persons involved with the control of hazardous energy and collect their ideas on workplace safety.

A second purpose of the survey was to obtain data on the practical constraints and specific needs affecting workers for the control of hazardous energy. These constraints include the context of the current work practices or needs, issues of time pressures, work planning and scheduling, and the level of training. With the resulting data, the discussions and efforts directed to the control of hazardous energy and workplace safety improvements can gain sharper focus.

The control of hazardous energy is only one of many risk-reduction methods that are part of a comprehensive solution to workplace safety. Knowing more about the control of hazardous energy enhances understanding of how LOTO and alternative methods fit into the overall solution. The survey addresses the control of hazardous energy to better understand the issues impacting its implementation. This survey comprises one step further along the path to reducing risks to an acceptable level.

Method: Population Sample

The target population for this online survey was personnel involved in the control of hazardous energy for systems. This population broadly included persons who actually perform tasks that require the control of hazardous energy (the workers), as well as their leaders, supervisors, and managers who are challenged to develop and maintain a hazardous energy control program that keeps workers safe from harm. The target audience for the survey included both system suppliers and users.

The survey was intended to solicit responses on a range of topics related to the control of hazardous energy and workplace safety. The survey was designed with 30 questions, three of which were specifically targeted to suppliers (users did not see these questions).

Results

The survey results are too voluminous to present in this article. Two

representative examples of the types of questions and responses are shown in Figures 1 and 2.

Highlights of the results include:

- Although some skepticism remains, the vast majority of respondents are using alternative methods as a means to control hazardous energy.
- A significant majority of respondents agreed that OSHA should consider adopting ANSI Z244.1 and incorporating risk assessment and the hazard control hierarchy to determine the most feasible methods for controlling hazardous energy.
- At present, both small and large companies are able to implement alternative methods with the skill set of their current employees.
- Most companies using alternative methods have some level of documentation or analysis to support the use.
- The survey results support the tenet that effective risk reduction is rarely just one solution, but rather is typically several, and will often include both alternative methods and LOTO.

One of the more revealing questions was, “What would be the immediate impact on production if your facility was required to use LOTO instead of an alternative method?” Respondents could answer this question in up to 200 words. This question gave them an opportunity to provide their views on the immediate impact on production at their facility if only lockout was required. The full report provides more detail on the responses. The following sections of this article group the themes of responses into general categories, followed by representative comments collected from the survey.

Alternative Methods Skeptics (3)

“It’s about keeping people safe, energy must be effectively controlled, using electronic circuits to try to control hazardous energy is a hazard!!!”

FIGURE 1
EXAMPLE: QUESTION 13

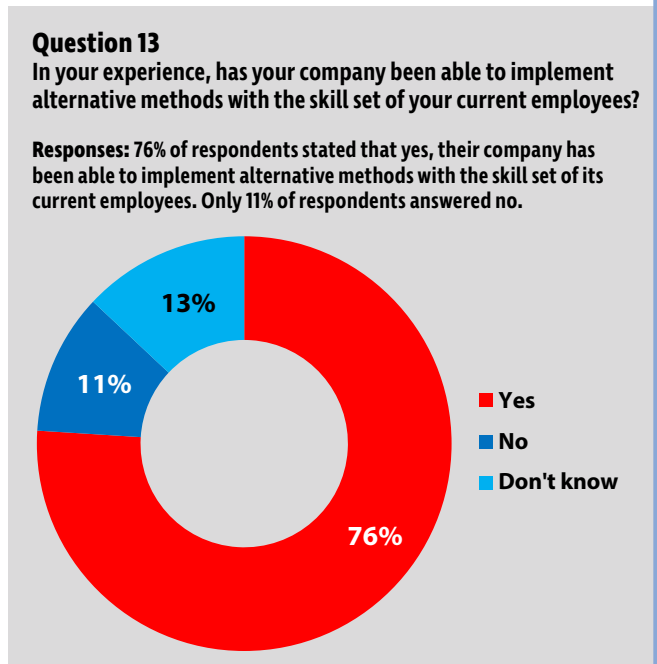
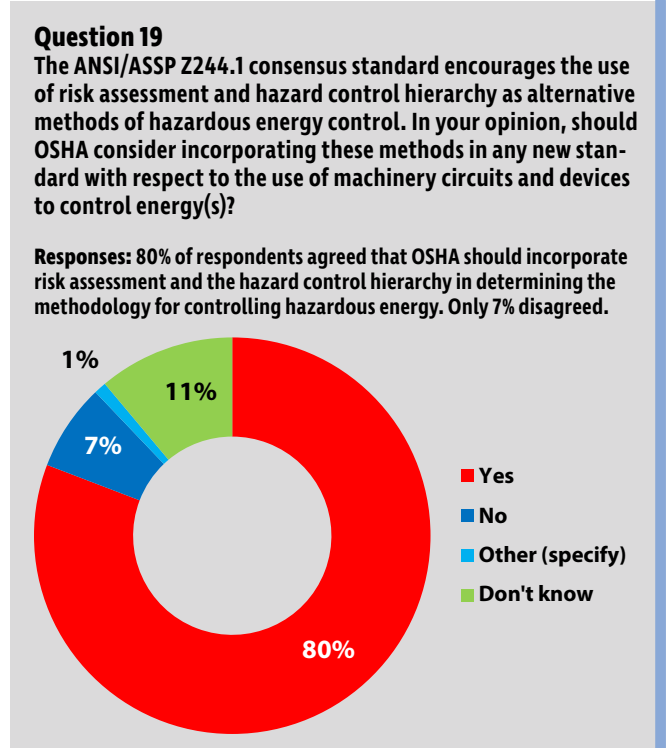


FIGURE 2
EXAMPLE: QUESTION 19



Minimal Impact (9)

"Minimum. When my company uses alternative methods, realistically it's in coordination with LOTO. It's more of a do both, not do one or the other situation."

Production: General (22)

"Adversely impacted; many LOTO tasks are not operator-executable and require an electrician to enter an MCC to de-energize and re-energize. This adds significant time/effort to the LOTO process."

"A decrease in productivity that would be difficult to recover from. Too many tasks need energy to be available while alternative methods are in use."

"Significant increase in operation costs and reduction of products produced. As well as increased risk of missing procedures."

"Production would be lowered drastically."

"We need to use alternative methods to maintain quality and efficiency of the process to stay competitive with the marketplace."

Production: Downtime (14)

"More machine downtime and less safe operating conditions."

"Major spike in equipment downtime, inability to meet

production goals due to minor occurrences."

"It would likely cause longer downtimes which may prompt employees to take shortcuts and have less effective protection measures in place."

Production: Service (3)

"The recovery time to restart from minor stops/jams would be much longer. It would also make change-over (which uses info and prompts on the HMI [human machine interface]) more difficult."

Production: Quantified Impact (6)

"It would shut down the line for up to 1 to 2 hours."

"When engines come off the end of the conveyor every 30 seconds, it would be huge. Our downtime is measured in seconds, not minutes or hours."

"A reduction of production between 15% and 20%."

Production: Significant Impact (7)

"It would prevent us from using some equipment immediately."

"Tremendous lost time."

Production: Safety & Behaviors (7)

"Significantly increase in costs and cause serious production delays with no increase in safety."

"It would create a massive incentive for intentional disregard for such a rule due to unacceptable reduction in productivity and perceived unreasonableness."

Inability to Run (10)

"It would be almost impossible to produce products with the age of our equipment. Many of our machines have so many isolation devices it would take too long to LOTO."

"It would shut most all facilities down; you cannot use LOTO 100% of the time. It is foolish to think we need to use LOTO when we can eliminate the exposure to HE [hazardous energy]."

"Some machines take an extremely long time to bring back up and can lose data if completely powered down."

Other (11)

"Extra time consuming and based on the production pressure LOTO often is short cutted. Using alternative, person independent removal of hazardous energies requires less training and is direct available."

"Could drive some manufacturing to other countries."

"Would be less safe."

The complete results of the survey are included in the full free report.

Implications

Survey Demographics

Between the sample size, the mix of suppliers and users, and the mix of company sizes and facility sizes, the survey offers reasonable perspectives on the challenges for the control of hazardous energy. The survey results are reasonably representative of the views of the target audience and can be relied upon for further analyses.

Technology Skeptics

Some of the respondents harbored some skepticism over the use of alternative methods. Three respondents clearly indicated they believe LOTO is a better and safer solution. One commenter correctly stated, “Alternative methods are not sufficient for some energy situations, i.e., e-stops are not sufficient for electrical energy, e-stops can fail!”

This perspective is not without merit. Blind reliance on control systems can be misguided. Determining if an alternative method or control system is well designed and suitable for the application can be challenging. There are also plenty of examples of functional solutions that “work,” but are not at all suitable for use in the application.

Impacts

Suppliers indicated that only 10% have systems that “never” or “rarely” include alternative methods. Half (48%) of the suppliers indicated that they include safety devices as alternative methods.

Implications of Global Competition

The inability to use alternative methods based on advancing technology is creating significant operational and safety challenges for suppliers and machinery, equipment and process users across many industries.

The ability for U.S. companies to compete in the global market is a valid consideration in terms of the control of hazardous energy. As noted by some respondents, requiring LOTO to be used when competitors can rely on alternative methods puts U.S. companies at a competitive disadvantage. Respondents highlighted such concerns, including the potential for work to be shifted to other

countries and the impacts on production if alternative methods were no longer allowed to be used.

Reliability of Modern Control Systems

One of the unfortunate consequences of OSHA’s enforcement efforts is that OSHA has interpreted the rules to exclude all control systems as alternative methods—regardless of the reliability of the control system (see Main & Grund, 2016). The relevant comparison is not

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whether modern control systems can provide reliable performance compared with a metal lock on a disconnect switch. Instead, the evaluation should consider how reliably the lockout procedures will be followed and the lock installed, versus the performance of the alternative method using an engineered control system.

A reasonable conclusion from this survey, the literature, and experience shows that lockout procedures, when used, reliably control potentially hazardous energy. Another reasonable conclusion is that lockout procedures are not always reliably used or are not as reliable as all might assume.

A primary conflict exists in that even though current technology offers solutions using alternative methods, the OSHA standards, definitions and enforcement activities do not readily allow the use of these solutions. The application, the reliability and quality of the components used, how the components are combined and the ability of the system to detect if something goes wrong all play a role in determining the safety performance or adequacy of the control system.

Control systems are not an absolute solution. The reliability of control

systems must also be considered. There are many applications where full energy isolation using LOTO is the best and most appropriate solution to keeping workers safe from harm.

Complexity

In earlier times, machinery, equipment and processes were relatively simple, and so, too, was controlling the energy sources. Machinery was often binary—many machines had a single drive motor and it was either on or off, energized or de-energized. That is no longer the case in many situations. A robot cell can contain hundreds of motors, hydraulics, and pneumatic actuators. Complex interactions between systems can make “switching it off and then testing to make sure it’s off” quite a challenge.

The added complexity offers both challenges and opportunities. Some of the challenges include knowing the energized state of the system, controlling the energy appropriately, and establishing the confidence to know the answers are correct. Some opportunities include safer and faster operations, ease of use, improved productivity, and more competitive operations.

The survey results reflect the complexity, with most respondents supporting the use of alternative methods and only a few against. The great similarities in the views on the reliability of both lockout and alternative methods show that each approach can be reliable when executed effectively.

Documentation Burden

The responses indicate that only 8% of the respondents had alternative methods without any documented risk assessment or supportive documentation, whereas 75% indicated they had some level of supporting documentation. These results are significant because OSHA and others have expressed concerns about the documentation burdens that might be imposed if the rules were to allow the use of alternative methods.

Adoption of ANSI Z244.1

Two questions focused on whether OSHA should adopt the ANSI Z244.1 standard and the incorporation of risk assessment and the hazard control hierarchy in determining the methodology

for controlling hazardous energy. In both questions, the majority of respondents (72% and 80%) agreed that OSHA should adopt ANSI Z244.1 and incorporate risk assessment and the hazard control hierarchy for controlling hazardous energy. Only 9% and 7% disagreed.

OSHA Constraints

OSHA has constraints on what it can do in developing new rules. There is a nine-step process OSHA must work through as part of promulgating a rule. The process is neither simple nor quick and requires considerable supporting analyses. OSHA must also balance the views of different stakeholders (e.g., employees, employers, small to large companies, unions, politicians, enforcement) in developing new rules. The “correct” answer of which solution is technically better as to LOTO or alternative methods is a significant consideration, but not the only consideration.

Potential Solutions

The outdated requirements in 29 CFR 1910.147 (which are more than 30 years old) create challenges for both OSHA and employers attempting to follow the requirements. Industry needs to be able to use alternative methods in lieu of lockout where appropriate. Currently, many applications of alternative methods exist that successfully control potentially hazardous energy without LOTO. OSHA is moving to update its requirements to help keep workers safe and protected.

The use of alternative methods should be limited to those that are appropriately designed, installed, used and maintained to be commensurate with the risk. Not all alternative methods provide an adequate level of protection to be used in lieu of LOTO.

With the pending update to ANSI Z244.1 (revision expected 2024), employers and equipment suppliers will have an improved process to provide alternative methods that provide effective protection in lieu of LOTO in certain applications.

The rules for the control of hazardous energy need to provide flexibility to companies to evaluate the best methods to use for their applications. This survey provides context and data that all parties can evaluate and apply to achieve that goal.

Conclusion

Based on the results of this survey, the time for debate on the question of whether alternative methods should be allowed or disallowed has passed. As shown in this survey, alternative methods are currently included in machinery, equipment and processes, and are already being used throughout industry to keep workers safe from harm. **PSJ**

References

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Views on the Current State of Controlling Hazardous Energy: A Survey About the Control of Hazardous Energy shares results and analysis of a survey conducted to assess the use of alternative methods in lieu of lockout/tagout to perform tasks. Download the free report at www.designsafe.net.