CONTROLLING HAZARDOUS ENERGY

Q&A With ANSI/ASSP Z244 Committee Chair, Bruce Main

There are many different forms of hazardous energy on worksites, and various methods exist for controlling them. Bruce Main, P.E., CSP, chair of the ANSI/ASSP Z244 committee, discusses how to train a workforce to properly isolate or control different forms of hazardous energy to reduce risks and prevent incidents.

PSJ: What is the scope of the ANSI/ASSP Z244 standard?

Bruce: The scope of the standard applies to all forms of energy. The point is to help safety professionals prevent unexpected startup and motion from occurring where people often get hurt, and there are two different ways to do that: lockout/tagout and alternative methods. The scope of the standard is very broad because it applies to many different industries, since everybody has energy that they need to control. It applies to machines, equipment and processes, which are everywhere.

PSJ: What are some common forms of hazardous energy that safety professionals might come across on a worksite?

Bruce: A very common form of hazardous energy is electrical energy at different levels, but also mechanical hazards and energy, including gravity, which is often overlooked. Pneumatic air or hydraulics are other energy sources. In addition, there are radiation energy sources.

Mechanical energy would be things like a spring; people have gotten hurt from the release of a spring because it expands. Safety professionals must look for and anticipate different forms of energy and, when looking at the tasks people perform, understand what energy sources exist and how to control them.

PSJ: Please discuss the process for analyzing different sources of hazardous energy and finding the best methods for trying to control them.

Bruce: Many times, it is about following the machine, equipment or process the manufacturer has suggested. Manufacturers often identify the energy sources and, in the instructions, explain when to lockout or tagout the energy for certain tasks. So go to the manufacturer first, whether it is a machine or a piece of equipment; they will often identify the energy sources.

In addition, a safety professional in an existing facility may have to put markers or identifying labels on the energy sources. The safety professional may need to put stickers on those energy-isolating devices and then label those on the placard or the procedure to help workers know exactly how many energy sources are there, where they are and which ones must be isolated.

PSJ: How can safety professionals isolate hazardous energy with different equipment or processes?

Bruce: Let's talk about electrical energy first. Typically, there is an isolation switch that can be thrown and then a lock or tag is put on that. The person with the key to that lock or tag has exclusive control of that energy source. Pneumatics tend to have a valve that needs to be closed before the lock or tag can be placed on it.

For gravity energy, a blocking device might be used—essentially, a block that has to be interlocked. Alternatively, a lock can be put in that system so that the block cannot be removed, which often occurs on presses. These blocks keep it from falling or drifting down when work is being done. Hydraulics also have a valve and, if there is nowhere to put a lock, a cover can be put over the valve and then a lock can be placed through it. In electrical energy, if there is cord-connected equipment, a worker can unplug the machine and put what is essentially a cover over the plug and put the lock over that. There are different ways to isolate the equipment, and a safety professional must determine the most effective and efficient method.

PSJ: What are some of those common alternative methods, and how can they help control different types of hazardous energy?

Bruce: There needs to be a distinction between a device and an alternative method. There are many kinds of safety devices that are used in alternative methods, but the alternative method is not just the device itself. A light curtain is not an alternative method; a light curtain can be used in developing alternative methods. An alternative method is a different means of controlling hazardous energy instead of isolating it. For example, a robot is not isolated. It still has energy, and it can move when it is told to move. But if the energy to that robot is controlled, it is like when a car engine is running and the car is in park—until it is put it in gear, it does not move. With the robot, it can be put in a safe standstill or a safe torque off where the robot will not move and it is safe for workers to, for instance, walk into the cell, wipe down a sensor or clear a jam.

An alternative method is not about isolating energy. It controls the energy, meaning that isolation is not necessary. The Z244 standard has very specific requirements in a 12-step process to make certain that workers are safe and that this process is done the right way. If a light curtain or e-stop that prevents motion is on a machine, we don't want someone to think that they can go in and do whatever they want inside the machine or cell. For instance, in packaging, a facility may rely on an access gate and the robot is not moving. It might be that the

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switch is not wired in properly or it has been defeated or the operator is broken off from the switch. That worker goes into the cell and a case shows up, and the robot grabs the case and starts to put it in a pallet. It is not just the device; it is not just the switch. It is essential to analyze how the energy is controlled to be certain that nobody gets hurt.

In the ANSI/ASSP Z244 12-step process, one critical element is exclusivity. How does the operator or the person that is relying on this alternative method ensure that they have explicit control, commensurate with the level of risk, so they know that they will not get hurt? Exclusivity with lockout/tagout is putting a lock on the source and taking the key. If it is in your pocket, you have exclusive control of the energy. The same idea should apply to alternative methods depending on the level of risk, although that does not mean there is always a lock or a key. For instance, if there is a case erector—a machine where an interlock panel can be opened and a worker can reach into the machine to clear a jam or make an adjustment—nobody can close that panel and restart the machine because the worker's arms are in it. If someone is in the way, it cannot be closed. There is exclusive control with no lock or key.

PSJ: Please provide an overview of the 12-step process and address how safety professionals can use it to develop a hazardous energy control program.

Bruce: Look specifically at clause nine in the standard because it talks about that very aspect of how to go about doing this and what is the right way to do it. In general, a feasibility evaluation must be performed to demonstrate, particularly to OSHA, that lockout is not feasible or that the alternative method might provide a better or safer solution.

A risk assessment is one of the key parts, and the reason a risk assessment must be completed is that if it is done, there is high confidence and the particular task that will be done under the alternative method as well as the hazards associated with that task are identified, and that the risk has been reduced using the alternative method and other safeguarding to an acceptable level. If a risk assessment has not been conducted, an alternative method cannot be used.

Other important aspects are the functional safety piece of determining whether the reliability of the circuit being used is appropriate for the level of risk, and there are industry standards available for this. Fault enunciation is another element. When I open the gate, how do I know that the robot is in a safe state and that the system is actually working? There is no requirement that you actually do that, and sometimes you can see that from the system itself. But other times a green light might come on to indicate that the system has been put into a safe state. So when the green light comes on, I know it is okay to go in.

I mentioned exclusivity, which was an important piece to the committee that wrote the standard. It is also important to OSHA. Similar to having the key in a pocket, how is exclusive control achieved while also ensuring that the equipment or the process will not restart? Tamper resistance should also be considered. It is important to ask whether someone can tamper with the system to bypass it.

Another element is the program. Very often, a lockout/tagout program states that a personal lockout cannot be used for anything other than lockout/tagout. But when an alternate method is being used, the program needs to allow that. We have helped companies rewrite their hazardous energy control program to support the use of alternative methods.

Another element in the process is that procedures must be in place. What that means is that the program needs to specify what tasks are allowed to be performed using the alternative method. Any other task must be done under lockout. Essentially, generate a list of tasks and put them through this 12-step process. If something needs to be added to the task list, that is fine, but it has to go through that process again.

Scope creep can be a concern. For example, when a worker is in a machine clearing a jam or wiping down a sensor, another worker may go in and change out a proxy switch, and that just cannot be allowed. Be very clear about which tasks are acceptable and which are not. We often see alternative methods in the converting industry where we take, for instance, a sheet of cardboard and cut it and print it to make it a pizza box. There are printer heads and dyes that need to be put on those printer heads, meaning that a worker may need to get into the machinery. This kind of machinery has a key, so the worker puts the machine into a safe mode, takes the key out, puts it on a ring on their elbow and goes into the machine to do the task. Nothing can move,

and that exclusive control is achieved. The worker then comes out of the machine, puts the key back and gets back into operation. That is an alternative method as opposed to locking out.

If you think about it, there are alternative methods everywhere. Every manufacturing facility is using an alternative method, whether they know it or not. If you own a food processor at home, you don't unplug the food processor to take the food out. You open the lid and reach in. That's an alternative method. When you use a photocopier, the machine isn't shut down or unplugged and a lock isn't placed on it. No, the photocopier has interlocks on the inside so when the machine is opened, the copier will not start up. A person can reach in to clear the jam, close it back up and go. That is an alternative method. Every manufacturing facility is using these, we just have to make certain that they are doing it correctly and keeping people safe.

PSJ: What does Z244 recommend to help safety professionals stay in communication with the workforce?

Bruce: There is a lot of content specifically about training in the standard. I was at a facility that used an alternative method. They recognized that they were not locking out, but they did not know what was allowed. We recommended training employees to be very clear what tasks are allowed to be done using the alternative method and which ones are not. Another important aspect of the training is the terminology. It is ingrained in people that when they are using a lock, it is locking out. But a lock being used on an access gate—so, before going into the robot cell, opening the interlock, accessing the gate and hanging the lock on it—gives exclusive control. Nobody can restart it, but it is not locking out; a lock is being put on a gate. The difference between lockout and locking has to be clearly understood. We have helped companies get out of difficulty with OSHA citations because the operators were using the terms incorrectly. They turned a switch and said that they locked it out by turning the switch. The compliance officer cited them because that was not isolating the energy, that was turning it off.

PSJ: Because things are constantly changing on worksites, it must be important to let workers know the state of equipment as soon as possible so that it does not lead to an incident.

Bruce: That's definitely part of the lockout process. It is not just putting a lock on there. You must know whose lock it is so that they can be contacted if they happen to leave the premises or if they are not at the machine. Often, the lockout location is different from the machine location, so it is not a local disconnect. It might be that the electrical isolation is in the motor control room, which could be hundreds of meters away from where the actual machine is. Somebody must be able to contact that person. Part of energy isolation includes putting a tag or having a person's name on a lock.

When using alternative methods, it is important to communicate who is doing what with employees. There are personal locks—whether they are lockout locks or whether they will become hazardous energy control locks—that can be used for lockout, or you can use for an alternative method that is part of the program that must be adjusted, and you have to train workers to remember that there might be separate locks. For instance, some companies may mandate that purple locks are used for the alternative method, and brass locks may be for lockout. Other companies may have two or three personal locks with a person's name on them that can be used for energy isolation or an alternative method.

PSJ: How can employees know who is authorized to use certain types of equipment?

Bruce: Under OSHA's lockout/tagout program, there are authorized persons, affected persons and other persons. Authorized persons are those who are authorized and trained to do lockout and isolate energy. Affected persons are those who are not authorized, but they are impacted by and they work near the machine. With the alternative method, there is the introduction of a potential new person, who is an alternative method authorized person. This happens often in companies that use temporary workers. For example, a temporary worker's job may be to stand in front of a robot cell and put parts in the robot that will weld the part. That worker may then take parts out, meaning that they will have to rely on the light curtain that is there at the opening of the machine. This person should also be trained on how to clear a jam when something happens, and they will need to rely on that alternative method again. They may not be trained on how to lockout, they are not an authorized person, but they are authorized to use the alternative method.

The training that an employer provides must be very clear on who is allowed to do which tasks and make certain that these workers have the necessary skillset and are properly trained to perform those tasks.

PSJ: Any additional thoughts?

Bruce: We have been applying the standard for a while now and using alternative methods, and I find it to be a very effective standard. I encourage people to get a copy of it, read it and apply it. With the new technology available, there is a lot of opportunity when using alternative methods to actually make systems and equipment safer by controlling the energy. The trifecta is when you achieve the safest and most efficient way as well as the easiest to use. Alternative methods have an opportunity to increase that trifecta with equipment and machinery. **PSJ**

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