

I know safety

Training plant personnel through virtual reality helps plants conform to regulations and save lives

The largest challenge for any plant, facility, or rig is keeping its workforce safe. According to US Department of Labor's Occupational Safety and Health Administration (OSHA), nearly three million workers, including machine operators and labourers, regularly service or maintain equipment that could expose them to a hazardous energy injury.

"Lockout/tagout (LOTO) procedures are an integral part of plant worker safety," says David Hirsch, CEO of Systran, a technical and training services company. "Precautions are not always followed even though everyone in the industry has heard of the devastating consequences of not having or not following lockout/tagout procedures."

Overlooking written procedures can result in life-altering accidents and even death, so one has to wonder if the hazards of improper or ignored lockout/tagout procedures are clearly understood.

Why comply?

Protecting employees, preserving equipment, and avoiding fines are the top three reasons for companies to comply with regulations. Research clearly shows LOTO procedures help prevent serious consequences. Last year alone 50,000 injuries and 120 deaths were prevented when operators followed energy control procedures.

Creating and implementing a LOTO safety programme are just the first steps to mitigate the fifth most cited OSHA violation. Companies need to go further and establish an overall safety culture through consistent training to avoid adding to future statistics. In the recently published Top Ten OSHA Violations for 2015, 3,223 total LOTO violations and over \$10 million (€9m) collected in LOTO penalties were recorded. Until LOTO procedures are consistently followed, incidents and violations will rise.

OSHA cited the following as the most common LOTO violations:



A virtual plant operator adjusting a valve



Simulated hands-on experience sticks to employees' mind better than simple lectures

- Failure to develop, document and utilise hazardous energy control procedures
- Failure to establish a LOTO programme that includes energy control procedures, employee training, and periodic inspections
- Failure to provide adequate employee training.

Problems with traditional training

Many employees do not have a mindset that prioritises LOTO, and inadequate training is at the centre of this issue.

The root of the concern is not that operators are complacent or forgetful. The unease results from employees not having sufficient, realistic training on the consequences of improper action. Simply put, operators do not recognise the benefits that outweigh saving time.

It is this mentality, perpetuated by outdated training methods, that is responsible for the high volume of accidents. Providing employees with only classroom training can be unsuccessful if the trainees are not completely focused on the presentation or lecture.

Furthermore, reviewing process flow diagrams and going over procedures without the equipment present to reference can be confusing and makes it difficult for trainees to interpret and understand the procedure and the implications of making mistakes.

While some facilities utilise purpose-built physical trainers to practice LOTO, they are expensive to build and only a few students can use the trainer at any given time. Going out into the field and using the plant to perform LOTO scenarios can be effective, but requires dedicated trainers working in small groups to be successful. These approaches are resource intensive and do not factor in the noise, heat, and other factors that impact learning.

"Many times, classroom training doesn't include the hands-on experience crucial for practicing and comprehending lockout/tagout procedures," explains Hirsch. "Until an employee completes the actions directly and sees how everything he or she does impacts everyone working in the plant, they will not understand the importance of following LOTO procedures every time."

Another training concern is the lack of demonstrations for trainees to visualise how to use the appropriate locks and tags. There have been countless OSHA-recorded incidents involving workers only locking out portions of the equipment they are servicing instead of the whole equipment system. Including hands-on experiences in training programmes reinforces learned information and provides trainees with much needed guided practice.

Train with virtual reality

Providing training that is engaging makes learners more inclined to focus on the benefits of LOTO and perform the appropriate procedures every time. Virtual reality, primarily used for video games, has been repurposed as a training tool designed to capture the attention of learners.

By using virtual reality, or VR, trainers can provide realistic training scenarios that are innovative and interesting to the learner. When the workforce is enthusiastic, they are more motivated to learn and retain significantly more of what they are taught. VR training is appropriate for all types of users because trainees visualise what they are learning and can practice components of their job in a safe and controlled environment.

In late 2015, Systran released LOTO EXP, its virtual experience training platform that brings the plant into the classroom and allows users to practice LOTO procedures in a virtual environment. The training tool is strategically designed to increase engagement and improve knowledge retention and build experience prior to going into the plant. The VR trainer was designed to support all types of LOTO training. In a classroom environment, the instructor can use the simulator to control the operator and demonstrate how each step is executed. The tool also allows trainees to step into the virtual operator's shoes and follow written procedures in the virtual environment.

"The scenario graphics, background, and moving character are all well-designed, which makes it interesting to work through the different tasks,"

accurately they perform the procedures. To reinforce the importance of following the proper protocol, trainees must adhere to the written procedures.

VR training programs have proven to be superior tools that engage a workforce, which is slowly but surely changing. Adapting training strategies to target the newer and younger generations, while also keeping the focus of the experienced operators, is a necessary balance. Programs such as Systran's LOTO EXP help build confidence that the workforce is competent to perform LOTO properly whenever needed.

End-user perspective

By tapping the power of VR, training tools can be customised to match any plant layout or environment. Trainees receive



Computer simulation improves operator training programmes

explains Brett Newton, learning development manager at a major petrochemical facility. "The simulator is a very effective tool, especially for new hire operations personnel."

The most effective VR training offers practice and feedback. To practice, learners can operate at their own pace while opening and closing valves, turning equipment on and off and connecting and disconnecting hoses. Since it is a virtual plant, students can interact with their environment, make mistakes and receive feedback to continue to learn how to correctly execute LOTO procedures. During the evaluation mode, the trainees' knowledge and comprehension are assessed to see how

immediate feedback on how accurately they can LOTO valves, pumps, hoses, and other equipment found in the plant they work in every day. The VR trainer also works to prevent mistakes, as it increases engagement around this critical topic.

Tools like LOTO EXP can be used to supplement current safety programmes. Cost-effective and easy to implement, VR training programs can introduce typical LOTO scenarios, act as a practice field for using procedures effectively, and evaluate the employee's ability to demonstrate competency. ■

For more information:

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