

August 2020

SAFETYZONE MAGAZINE

**E-Learning Critical
for Keeping Your
Organization
Trained During
COVID-19**

**Avoiding Costly, and
Potentially Deadly,
Shortcuts in Netting
System Selection**



**Online
training**



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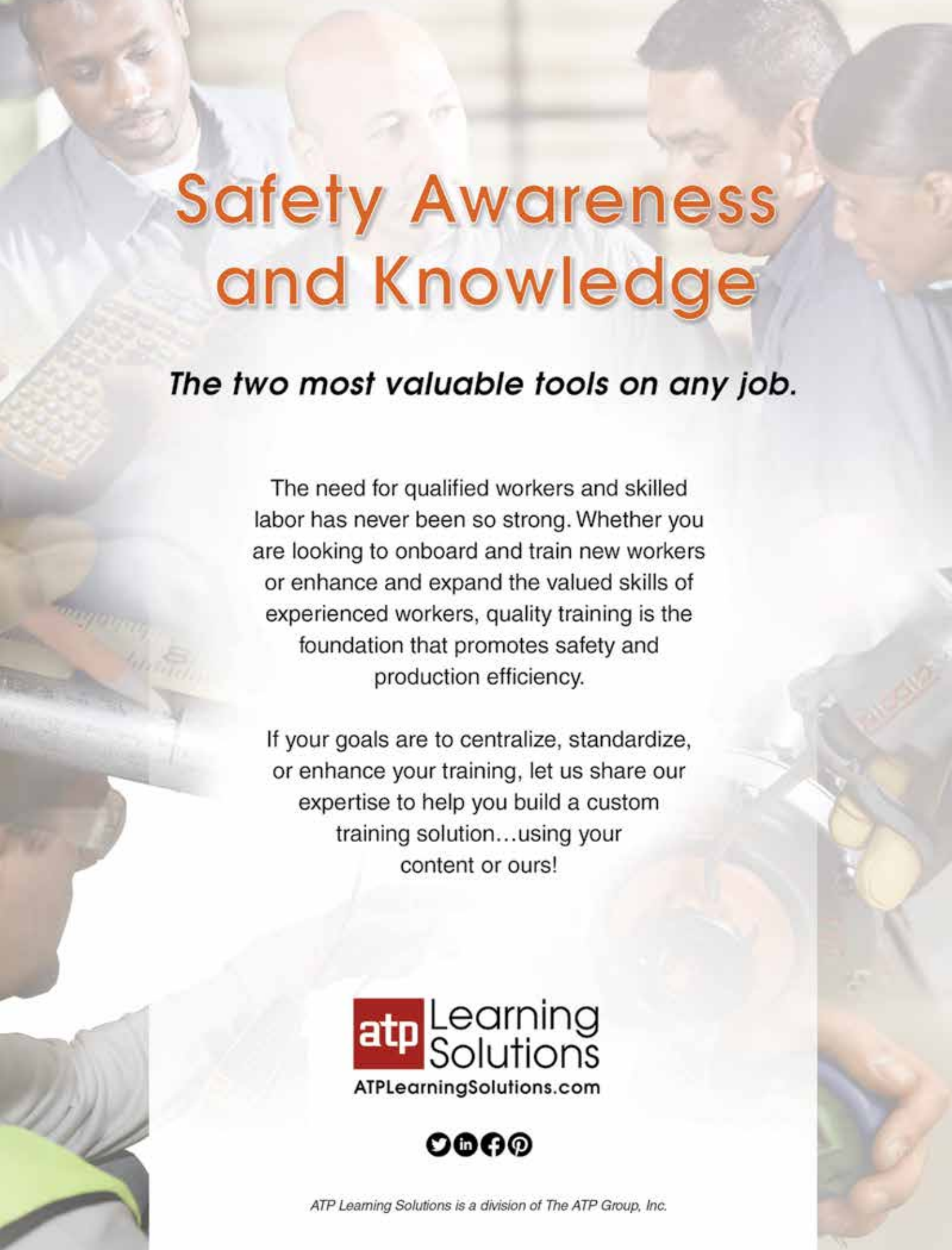
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Avoiding Costly, and Potentially Deadly, Shortcuts in Netting System Selection

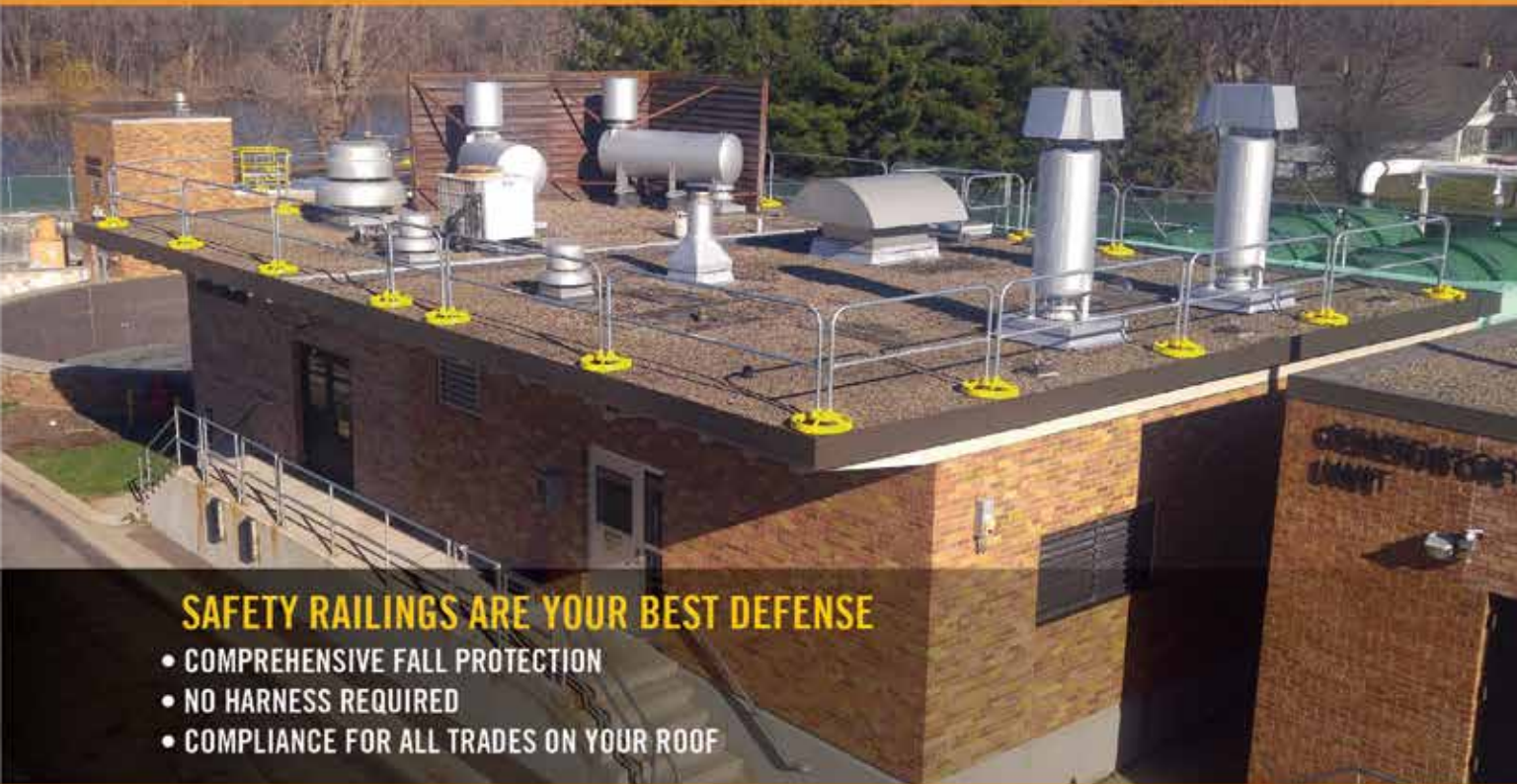
The variability in netting system quality and design illustrates the critical role of third-party experts when selecting fall protection and debris control systems for construction projects

Construction managers, general contractors and building owners are certainly familiar with safety netting systems and the reasons to install them, which include protecting workers and debris from falling from structures, as well as façade and ceiling containment. They also believe these passive systems create and maintain a safe work environment.

However, when it comes to specifying the appropriate solution for a construction project, many see netting systems as, well, pretty much all the same.

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you can't take shortcuts and put up netting that seems easier, or maybe requires a little less labor."

There are other reasons that well manufactured and designed netting system also makes good business sense beyond the safety aspect. It can also reduce insurance costs, improve safety ratings, speed productivity, boost worker morale and create a positive public image.

No Shortcuts

As vice president of risk management at a major construction firm in New York for 20 years and now president of his own company, Weidmyer has witnessed the variability in netting system installation first-hand.

Given his company's focus on risk assessment and loss control, Weidmyer has had the opportunity to work with contractors in New York, Connecticut, New Jersey, and Florida to review their insurances and to monitor their safety program and protocols.

Outside of New York City, which is known for the some of the most stringent netting system codes in the country, Weidmyer says, "I've seen netting system installed by contractors that I feel slice it thin in terms of protection. For example, they install a debris net that serves only the minor purpose of catching light debris, but if somebody fell into it, it is not going to support them."

Weidmyer says that in New York City, the nets specified and installed are often expected to serve double duty of catching heavy debris as well as

In reality, this could not be further from the truth, given the broad variability in the quality and construction of nets, suitability for the stated safety purpose, quality of testing, and other factors that impact the ability to meet a broad range of national and state fall protection and debris control standards.

While this list is extensive, it only serves to underscore the fact that netting system selection should squarely rest in the domain of experts and engineers, and not viewed as a mere commodity item. As such, contractors and building owners often rely on third parties with a wealth of netting-specific knowledge and expertise when devising safety plans or designing and installing rented or purchased nets, and systems.

"You can't just put a netting system together that you feel is going to work, only to realize at the end of the day it was not sufficient for the purpose," says Harry Weidmyer of Construction Safety Service and Solutions. "You are taking something that is a vital part of safety on a project and so

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providing personnel fall protection. The codes even require paperwork that verifies the integrity of the manufacture of the net itself.

OSHA Guidelines Subpart M and Article 19 of the NYC Building Code require specific safety systems on a construction site. To meet the guidelines, contractors must submit a site safety plan to the city.

For high rise buildings 15 stories or more, netting is typically mandated in the safety plans from the 6th floor up. Nets are the primary passive fall arrest system option on the market and usually the most cost effective. They provide not only fall protection and the separation of trades, but also protection of workers and the public, in addition to other property below from falling debris.

In addition, netting can be used for other purposes including as a scaffold and barrier netting and for façade containment, to protect the public from falling debris from deteriorating buildings until permanent repairs can be undertaken.

For the past 35 years, Weidmyer says he has relied on Pucuda – Leading Edge for the netting system designs in his safety proposals. Pucuda – Leading Edge designs the system and can submit the relevant paperwork and follows through until it is authorized by the Department of Buildings, if needed.

Pucuda – Leading Edge is one of the few netting system manufacturers that produces nets in the United States and that has a history of innovation in product design. The company was founded 27 years ago by hands-on netting expert John Rex

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road, President, Founder and CEO of the company.

Weidmyer says the company is basically a one-stop-shop and he also turns to them for the nets as well, all of which conform to all ANSI, OSHA, Army Corps of Engineers, and ASTM standards.

"John is a phenomenal net system designer and so is his team," says Weidmyer. "I have recommended him to quite a few contractors in New York City because I know his systems are designed properly and there is no second thought or concern about them working properly."

Cape Canaveral Launch Towers

Pucuda is also involved in a unique project at the Kennedy Space Center at the Air Force station at Cape Canaveral, supplying netting systems for a structural steel project to construct a launch tower and a lightning strike tower.

"On a portion of this particular project, we are building two towers and the primary function of the netting is to catch debris," explains Alan Bukis of S&R Enterprises, the on-site project manager for the structural steel construction company. "So, if somebody is working up on level 400 and accidentally drops something, the debris netting will catch it before it goes to the ground and potentially hurts somebody."

In addition, the nets are technically rated for fall protection even though it is not the intended use. In addition to the netting, workers are expected to tie off using a fully body harness whenever they are six feet above the floor.

These towers represent protection for the first new build of a Launch Pad in several decades. Therefore, it was important for S&R to interview several netting manufactures.

"Overall, [Pucuda – Leading Edge] had the best

presentation as far as we were concerned," says Bukis. "John Rexroad definitely knows the netting industry inside and out, and it was very evident in our initial discussions."

One important aspect of the presentation was a review of samples of the netting, brought in by two of the three companies. "By appearance alone, you could see there was a higher quality netting with Pucuda – Leading Edge," says Bukis. "The other company brought a sample and it was a considerable difference.

Quality in the manufacturing and materials of netting is a major factor in the selection process. Many nets supplied by U.S. based companies are imported from China or India where the manufacturing process is driven by supplying an inexpensive product in mass quantities.

Even nets that appear adequate may have quality issues lurking under the surface that are not easily identifiable by the untrained eye. One example is a deterioration condition caused when an overseas supplier manufactures a net with a linked polymer that begins to deteriorate almost immediately. The condition is referred to as "wooly bear" syndrome, due to its appearance. This can dramatically affect the longevity and safety of the products.

Although in the construction industry nets are often rented for a project, S&R Enterprises decided to purchase the nets from Pucuda in anticipation of additional future projects. For this reason, it was even more important the net and system was manufactured with the highest quality materials and with longevity in mind.

Bukis says there were installation challenges to overcome as well, as one of the towers was a sloping triangle that progressively narrowed as it went up.

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“When our team was installing the nets, they had a ton of questions about installing the netting correctly,” says Bukis. “So, we asked John to come to the site.”

“He is not afraid to come out and go up in a structure and actually look at the installation,” adds Bukis, noting that this was also during the COVID-19 pandemic. “Just him being here and knowing that he’s the expert and him confirming that the installation was correct alleviated all their concerns. So, it was definitely beneficial that he was willing to come out and do that.”

With netting systems, the most well-designed and manufactured systems are those that go unnoticed and can be taken for granted. It is only when someone, or something falls and causes damage or injury to people or property and it makes the evening news that netting systems take center stage.

With so much at stake, contractors and building owners would be well served to seek out expert advice from netting system experts to avoid installing defective products that fall below the safety standards.

“It all comes down to safety,” explains Bukis. “If something or someone happens to fall, you are going to want the best nets available. I feel much more comfortable with a higher quality product, because the goal is, we don’t ever want any of our people hurt.” •

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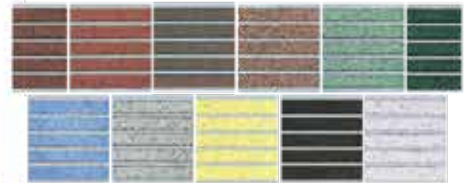


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E-Learning Critical for Keeping Your Organization Trained During COVID-19

Author: Bill French, CSP CORE Safety Group

The COVID-19 pandemic has undoubtedly created many challenges for employers. Development of COVID-19 specific plans, addressing positive cases and all things related to controlling the spread of a virus that does not appear to be slowing down anytime soon. As important as protecting employees from COVID-19 is, it's also important not to neglect other needs of our workforce, in particular, the safety and health training needs of our essential workers.

Each day 14 workers lose their lives due to workplace accidents in the U.S., that's nearly 5,250 workers every year. It's important not to lose perspective on the value that we placed on preventing these losses prior to pandemic.

In addition, most often, after any significant job-related accident one of the most common contributing causes is a lack of worker training. In relation one of the most cited violations by the Occupational Health and Safety Administration (OSHA) is failure to provide required training.

For good reason, there has been a shift way from classroom style training due to social distancing measures. However, there are ways to ensure workers are getting the safety training they need. Even before COVID-19 there was already a large demand in education technology. As data as shown over several industry sectors not just academic, online training has been on the rise. Below are several benefits of online and virtual training.

Most safety training assigned to employees (i.e., hazcom, lifting safety, hazard recognition) is perceived as a bureaucratic requirement that they are required to sit through. However, it is possible to make this process less of a chore for employees if the training is offered wherever they are and whenever they're available. This is where online training becomes a great tool. Below are some of the benefits of online or computer-based training.

Benefits of online training:

- **Cost Effective.** Course costs are reduced and there is no down time, travel or accommodation costs. In fact, the reduced cost is likely to most convincing reason for the use of online training. Since the largest cost of any training is individual time spent in training, this makes a significant difference to the bottom line and frees up personal time.
- **Time Effective.** Studies show that online training is generally 25% to 60% shorter than face to face training on the same subject. For example, a traditional 32-hour course could be trimmed down to 9 hours. The shorter version of the class still contains all the same lectures, exercises, and quiz questions. This compression is possible due to cutting out multiple scheduled breaks that occur during normal training. As an instructor myself, when dismissing a group for a break, 5 minutes can easily turn into 15 minutes by the time all the participants return to the class and we can continue with the lesson. Another time-consuming issue during traditional training is the need to stop for questions. While questions are normally welcome because they are an indication that students are engaged and curious about the subject matter. However, in some cases questions aren't questions, but instead a student is interrupting the flow of the instructor to demonstrate their own expertise on the topic. Finally, one of the most time-consuming issues during instructor lead training is "chasing rabbits". As a self-proclaimed tangent trainer. I can get sidetracked telling stories. While the use of anecdotes related to the topic can help seat a point, it often eats of valuable time and can result in participants losing focus.
- **Increased Convenience.** Without the location or time limitations of a traditional classroom setting, employees have the freedom to absorb content and engage with peers, at a time and location that they will learn best. The ease of accessibility of an online learning platform gives employees the opportunity to take a break at certain times of the workday to take a class. This allows employees to learn at various times of the day, such as during a lunch break, or on their commute to and from work. This type of flexibility is not possible with physical classrooms. Classes are available 24 hours a day.
- **Just in time Training.** Companies don't tend to hire large waves of people affording them the occasion to get all the new employees together for a multitude of trainings necessary before putting them to work. As a safety consulting firm we often get calls from companies who need a training class for one or two people. The cost and time commitment to bring in a third-party instructor or even use an in-house trainer for just one person is not worth it. Online training fulfills this immediate need for training a small group and gets time to work as soon as possible.
- **Accommodating Different Learning Styles.** Researchers are finding that not every employee is the same and sitting in a classroom for hours to learn about a topic may not be effective for everyone. Online training requires 40-60% less time to learn and allows employees to comprehend topics on their own terms, on many different devices. Participants that may be easily distracted in a classroom seating by other students are able to navigate through a training module, without being sidetracked. If they didn't comprehend the message, they can easily rerun the module without effective other students. The self-paced approach is appealing to many adult learners.
- **Consistency of Content.** One drawback to instructor lead training is that delivery of the message differs between instructors. Even if the same instructor is used something could be left out from one session to another. By using online training, the content of the training regardless of when it is delivery is the exact same. It is also easier to update content when necessary and have employees retake the training.

- **Knowledge Retention.** For many, online instruction delivers a more effective learning experience because of the ability to have short, interactive modules that can be repeated if needed. These short modules also referred to as microlearning, help employees find what they need quickly, and help break up learning to make it more comprehensible.
- **Immediate Feedback.** If the online training is being used for compliance, or another type of learning topic that requires a test of knowledge, employees can get immediate feedback on how well they comprehended the information. In traditional classrooms, feedback could take days to disperse, and by that time, the feedback won't be as valuable. With online training administrators also see an added advantage of being able to track these knowledge tests for their records.
- **Decreasing the Length of Classroom Training.** The use of computer-based training in a blended learning approach and significantly decrease the time needed to complete an employees training. For example, the fundamentals of a topic such as fall protection can be taught through the computer module. Later a hands-on portion can be performed to reinforce the basics and the learner demonstrate their competency.
- **Environmentally Friendly.** Online training has the smallest carbon footprint and is the most sustainable learning solution. Eliminating the requirement of travelling or the printing of hundreds of pages of hand-outs makes online training the "greenest" approach to training.

So, in the conclusion, the use of online training is a no brainer. We understand the reluctance to moving

away from traditional instructor led training. Instructor led training will always have its place and value in certain scenarios. However, with the overwhelming benefits to online training, especially the reduced cost, we are guaranteed to continue to see the use of computer-based training increase.

About the author: Bil French is the Director of Safety Services at CORE Safety Group, a nationwide safety consulting firm. He manages a team of safety professionals who serve their clients in all facets of safety and health management. He works with the leadership of his clients to strive for excellence in safety. He is a high energy leader and an expert in safety coaching.

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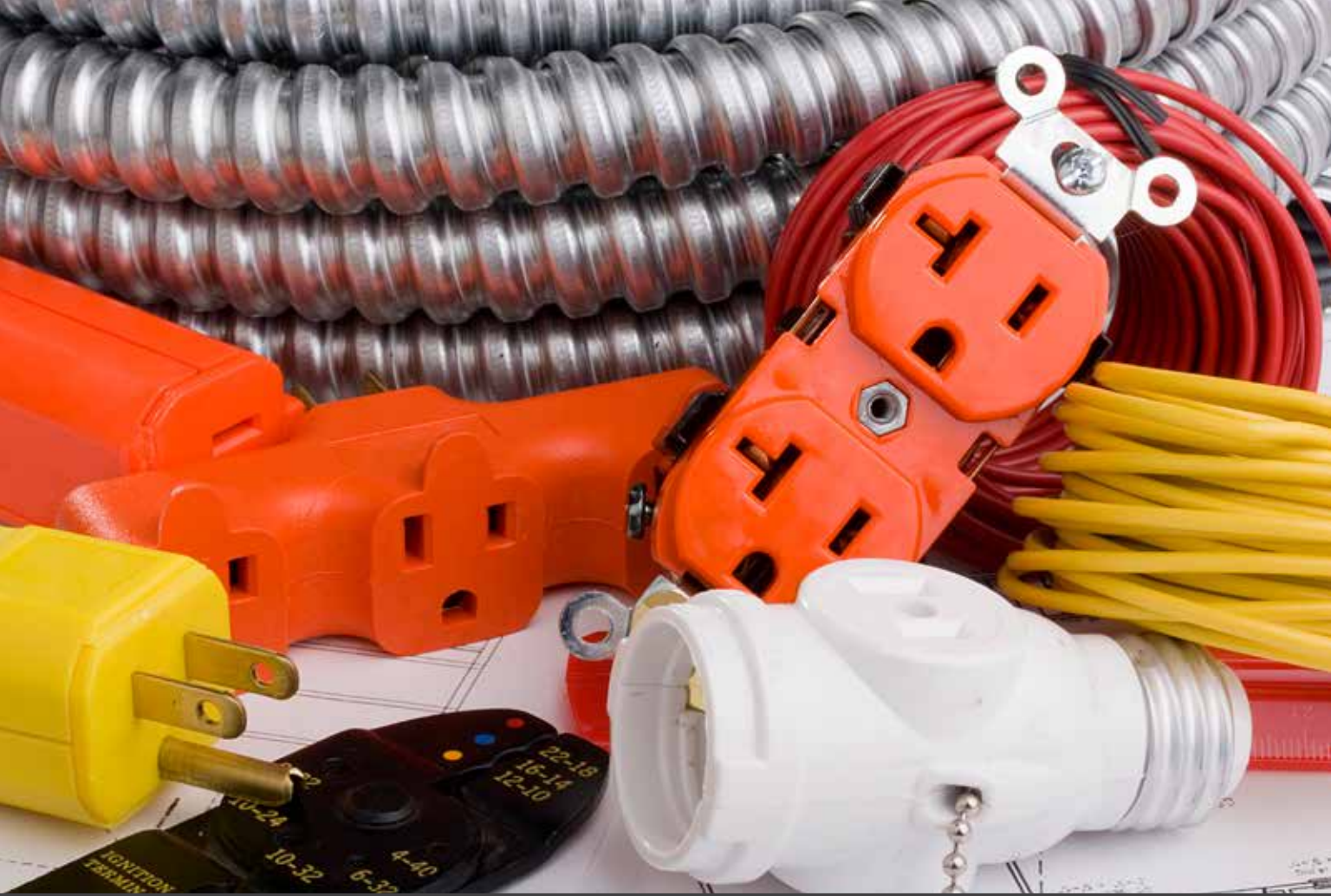


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Low Voltage Electrical Hazards in the Workplace

Introduction

Each year 120 Volt circuits cause more deaths and injuries than circuits of all other voltage levels combined. Such low-voltage circuits are extremely hazardous for two reasons. First, low-voltage circuits are the most common because they are the final distribution voltage, 240V, 208V, and 120V circuits are used throughout residential, commercial, industrial, and utility systems.

The second reason for extreme danger of low-voltage circuits is user apathy. Comments such as “It can’t hurt you; it’s only 120 volts” are heard all too often. 120 Volt circuits can produce currents through the human body that can easily reach fibrillation levels. Consider a perspiring worker using a metal electric drill with one foot immersed in water. Clearly under this condition a worker can be subjected to a lethal shock. Furthermore, if sustained for a sufficient period, 120 Volt con-

tact can create severe burns. I will spell out several techniques to avoid electrical incidents later in this article.

Warning Signs

It is my opinion that we have dumbed down our society's electrical safety knowledge by placing "DANGER – HIGH VOLTAGE" signs on every level of voltage and have led the population to believe the only voltage that is dangerous is high voltage. In reality, and by OSHA voltage standards, most people in American workplaces are always exposed to low voltage and almost never exposed to high voltage.

Electrical Hazard Warning Signs should be labeled "DANGER – HAZARDOUS VOLTAGE," to help people understand that all voltages are potentially dangerous. Based on the fact we kill more people on low voltage than any other voltage, "HAZARDOUS VOLTAGE" markings make a lot of sense.

A Common Low-Voltage Hazard Sources

Some of the low voltage hazards that lead to electrical shock and electrocution hazards are related to the use of extension cords and portable electric tools.

Extension cords that are not handled properly can easily become an electrocution hazard. If cords are twisted up, run over with forklifts, pinched or crushed, or if the jacket is broken at the plug cap or where the cord is wrapped around a drill, saw or grinder, the ground conductor can easily become broken.

Frequently, ground pins are broken off so the cord can be plugged into a two-wire receptacle that does not have a ground. Or, a three-prong plug is plugged into a UL approved adapter designed to be plugged into a two-pronged outlet. Plug caps are replaced by personnel that are not electrically qualified and are improperly wired. These situations create a death hazard because there is no low impedance ground connection to cause enough current to flow to blow a fuse to trip a circuit breaker to clear the fault.

The Circuit is Grounded

We have all heard many, many times a phrase that should have never been uttered in the first place. That phrase is: "Electricity always takes the path of least resistance." Because of this misunderstood statement, many assume that all current will flow through the ground wire. However, this statement is only partially true! The truth is that electricity takes every path available to it no matter what the resistance of the path, and there is almost always more than one path.

For example, when an electric tool equipped with a three-prong plug shorts out, the person holding the tool is an alternate path to the earth; thus, the current will split between the person and the electrical ground wire. If the ground conductor is broken, or if the ground pin has been broken off the plug, or the 3 prong plug is plugged into an adapter and energized from a 2 prong receptacle, and the tool shorts out, the person becomes the only path to the earth. In either of these cases, there may be enough current through the body to be fatal.

How much current is enough?

There is no safe path through a human body for electrical current That is – any current through the body from an external source can cause unwanted results depending on magnitude.

Current	Effect
1 mA	Barely perceptible
1-3 mA	Perception threshold (most cases)
3-9 mA	Painful sensations
9-25 mA	Muscular contractions (can't let go)
25-60 mA	Respiratory paralysis (may be fatal)
60 mA or more	Ventricular fibrillation (probably fatal)
4 A or more	Heart paralysis (may restart through CPR)
5 A or more	Tissue burning (fatal if vital organ)

Table 1 shows the *approximate* effects that current may have on the human body. Several conditions may modify any given effect such as:

1. The actual path through the body. For example, current from the hand to the shoulder is not likely to cause fibrillation since it does not pass through the heart.
2. The length of time the current continues to flow. For example, currents in the 9-25 milliamp range through the heart for a short time, will probably not cause fibrillation to occur. However, since the victim may not be able to release contact, fibrillation may indeed result.
3. The health and other physical characteristics of the individual receiving the shock.
4. The frequency of the current flow may make a difference. Different frequencies of current affect the body in different ways. All the values in Table 1 assume frequencies of 60Hz or lower.

Example

If the path through the body has 7,500 Ohm resistance, and the tool is energized at 120 volts, the resulting current flow through the person is 0.016 of an Ampere, or 16 milliamps. When you pass current through a muscle, the muscle contracts. When the current reaches the level where the muscle contracts and the person loses voluntary muscle control, it is referred to as the *let go threshold* or *paralysis threshold*. This means that the muscles clamp down and the victim cannot release their grip on the shorted tool.

Fibrillation

When the heart is in fibrillation, it flutters arrhythmically and does not pump any blood. Fibrillation of the heart is the most common cause of low voltage electrocutions.

As you can see in Table 1, the range of current flow for this example is between 9 and 25 milliamperes. This varies among individuals. Even with that small amount of current, the victim can be paralyzed and can do nothing to help themselves. If no one is available to rescue the victim, their heart may start to fibrillate.

There are no documented cases of anyone's heart going into fibrillation and returning to normal rhythm without the assistance of outside intervention. If the heart goes into fibrillation and there is no one available and trained on the use of an AED (Automatic External Defibrillator), the person will die.

Protection from the effects of electrical shock

Most untrained and even some well-trained employees do not understand that anytime you place your hand on a piece of energized electrical equipment, you become a resistor in parallel with a short piece of conductive wire or metal structure. The voltage characteristics of parallel resistors is that each of the parallel resistances experience the same voltage drop across them.

Generally, breakers and fuses in industrial installations are sized according to the current carrying capacity of the conductors installed in the circuit. Everything is installed according to the National Electrical Code (NFPA 70) and are designed to not overheat the conductor and thereby prevent burning the plant down. This means that the fuses and circuit breakers in a system cannot be depended upon to protect the worker from shock.

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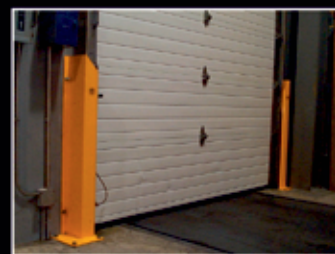
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sonnel is a GFCI. This device will trip for currents between 4 and 6ma. They are equipped with a breaker in the energized leg that will trip within 25 milliseconds. If a person is holding a steel cased tool that shorts out with bare hands, all the time the case of the tool is energized they are part of the circuit with current flowing through their body.

OSHA and the NEC rules mandate the use of a GFCI anytime portable energy supply is used. This means anytime you use a portable generator or an extension cord in the workplace the use of a GFCI is mandated.

Qualified workers and job safety briefings

OSHA states that qualified electrical workers are the only personnel that can be exposed to voltages greater than 50 volts. NFPA 70E 2018 Edition defines *Qualified Person*. "One who has demonstrated skills and knowledge related to the construction and operation of electrical equipment and installations and has received safety training to identify the hazards and reduce the associated risk." Note that only *qualified persons* may work on or near energized conductors.

OSHA also mandates a Job Briefing be held before the start of each job. "The employee in charge conducts a job briefing that meets paragraphs (b), (c), and (d) of this section with the employees involved before they start each job."

"The briefing shall cover at least the following five subjects: Hazards associated with the job, work procedures involved, special precautions, energy source controls, and personal protective equipment requirements."

The number of briefings: "At least one before the start of each day or shift. If the work or operations to be performed during the workday or shift are repetitive and similar, at least one job briefing shall be conducted before the start of the first job of each day or shift.:

"Additional job briefings: shall be held if significant changes, which might affect the safety of the employees, occur during the course of the work."

Extent of job briefings

"Short discussion: A brief discussion is satisfactory if the work involved is routine and if the employees, by virtue of training and experience, can reasonably be expected to recognize and avoid the hazards involved in the job. A detailed discussion shall be conducted if the employee cannot be expected to recognize and avoid the hazards involved in the job."

"Detailed discussion. A more extensive discussion shall be conducted: If the work is complicated or particularly hazardous, or, If the employee cannot be expected to recognize and avoid the hazards involved in the job."

"Working alone: An employee working alone need not conduct a job briefing. However, the employer shall ensure that the tasks to be performed are planned as if a briefing were required."

When the heart is in fibrillation, it just flutters and does not pump any blood. Fibrillation of the heart is the most common cause of low voltage electrocutions.

Training requirements

Training, or lack thereof, is a relatively large problem in the United States. OSHA and NFPA 70E lay out mandates and responsibilities. An example can be found in NFPA 70E 2018 Edition in Article 105.3, and I quote it here:

(A) "Responsibility. The employer shall have the following responsibilities:

- (1) Establish, document, and implement the safety-related work practices and procedures required by this standard.
- (2) Provide employees with training in the employer's safety-related work practices and procedures.

(B) Employee Responsibility. The employee shall comply with the safety-related work practices and procedures provided by the employer."

Another excellent information source is the Informative Annex Section published in NFPA 70E 2018 Edition.



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Informative Annex K. General Categories of Electrical Hazards.

Lists General information pertaining to Electrical injuries and fatalities, and general categories of electrical shock and electrical burns. It states, "About 98 percent of fatal occupational electrical injuries are electrical shock injuries. 40 percent of electrical incidents involved 250 volts or less and were indicative of a misperception of electrical safety as a high voltage issue."

Informative Annex Q – Human Performance and Workplace Electrical Safety

Annex Q states: "Based on studies done by high-risk industries indicate human error is often a root cause of incidents. The premise of this annex is that human error is similarly a frequent root cause of electrical incidents."

Summary

This article considers some of the safety-related concerns that apply to low voltage circuits – that is, circuits of 1,000 Volts ac or less and 250 Volts dc and less. Workers should treat low-voltage with the same degree of respect afforded medium and high-voltage circuits.

Electrical safety does not just happen. It requires knowledge of the electrical hazards and potentially hazardous conditions and situations. And, it takes constant effort and vigilance to maintain an electrical safety program, whether you are working alone or with other employees. •

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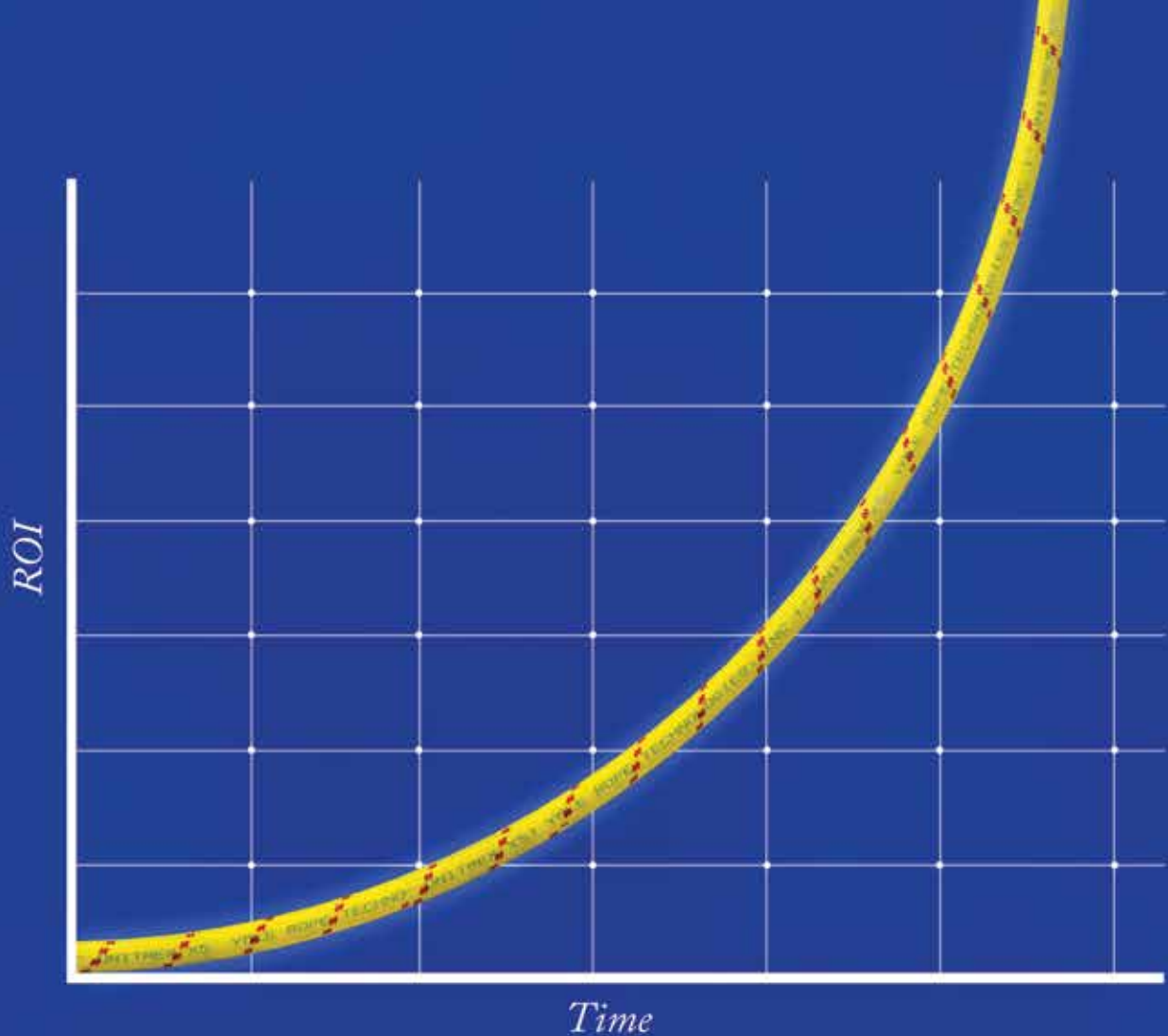
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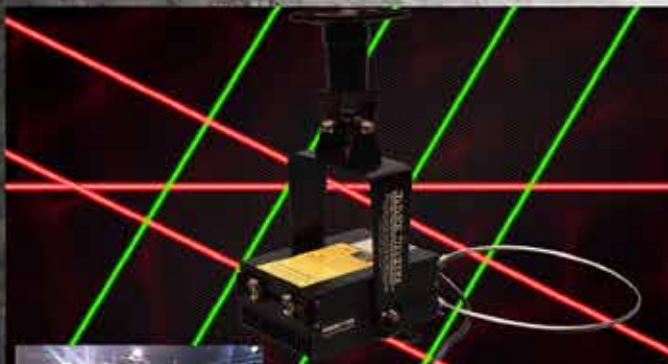
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