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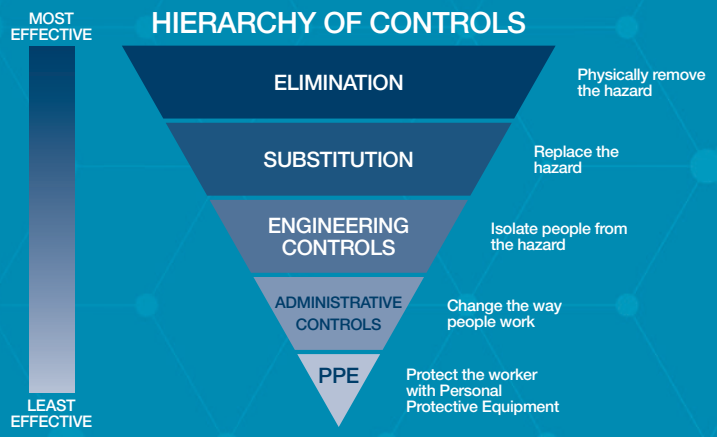
infrastructure for a connected world

Prevention through Design: How Design-First Thinking is Improving Safety on the Plant Floor

WHITE PAPER

Safety is a responsibility. Moreover, it can be said that safety is a shared responsibility. So, while safety is a constant state of mind on the job floor and in the workplace, often woven into the fabric of a company's culture, safety actually begins with design-first thinking.

Safety by design, as a principle, is an achievable intervention that improves worker health and safety. Designing to eliminate or avoid hazards altogether, before any exposure happens in the workplace, is also the top priority in the hierarchy of risk controls common to industry safety professionals.



And, this is more than a buzzworthy trend. Known today in practice as Prevention through Design (PtD), it includes all efforts to envision and eliminate hazards to workers in facilities, the processes and procedures, as well as the tools, equipment, products, and new technologies that come in contact with the people in the workplace.

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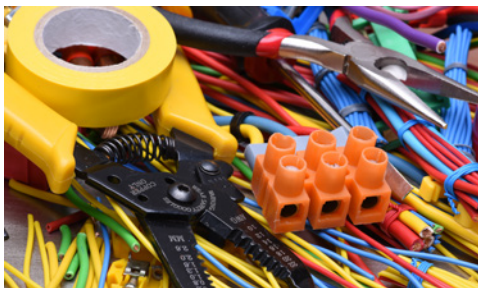
Prevention through Design: Then, now, and tomorrow

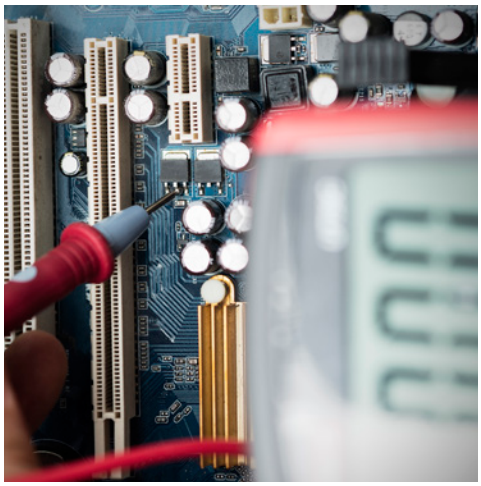


Prevention through Design (PtD) is a concept that is firmly taking hold within the safety and plant engineering community, and is especially significant in the manufacturing industry. Hazard analysis and risk assessment have always been core tenants of safety by design, but the definition of PtD, according to The National Institute for Occupational Safety and Health (NIOSH) literature, is:

> **Addressing occupational safety and health needs in the design process to prevent or minimize the work-related hazards and risks associated with the construction, manufacture, use, maintenance, and disposal of facilities, materials, and equipment.**

Today, just about every manufacturing process has a bevy of inherent safety risks, so it's important to identify and minimize potential hazards from the very beginning. It's also becoming common for PtD approaches to attempt to solve for uncertainty, in that the actual safety of a technology or use of a product largely depends on the behavior of workers in and during the process.

Nowhere is this more prevalent than in the responsibility for electrical workplace safety. With PtD, new technologies and products attempt to reduce human exposure to hazards as much as possible to achieve higher levels of safety. Sometimes, in lieu of designing for complete elimination of the problem, there are times when it's best to design for the tendencies of the user, or simply stated: design for the responsibility of safety. This requires design engineers to work closely with and understand the needs of safety managers as well as the qualified electrical operators and maintenance workers who use the products and devices on a daily basis.



At Panduit, the goal of PtD is to make electrical infrastructure safe for all workers, throughout the entire lifecycle of the facility, which necessitates designing for safety during normal plant operations and routine maintenance but especially, and probably most importantly, for abnormal service and repair situations. Plant design engineers and electrical systems integrators need to think about where the responsibility for safety is most acute and then specify and integrate the appropriate product technologies accordingly.

Within the arena of electrical safety in the workplace, product development by way of PtD is achieving safer workplaces while simultaneously increasing productivity. Several PtD product innovation examples include permanently-mounted voltage indicators, voltage portals, data access ports, infrared (IR) windows for thermal inspection, and absence of voltage testers.

The process of de-energizing and verifying equipment is in an electrically safe work condition before beginning work can prevent electrical incidents. A 2012 study found that the most common work task leading to arc-flash injury was replacing fuses without turning off the power and verifying that the fuses were de-energized. The data also indicated that there may have been a lack of training and judgement by those injured, underscoring the need for emphasis

on creating an electrically safe work condition that includes that process of voltage testing before beginning work.

Because this process occurs frequently in the workplace, it is worthwhile to examine whether it can be optimized using PtD methodology.

Safety managers today are challenging electrical infrastructure suppliers, like Panduit, to create even better methods of identifying and verifying de-energized electrical equipment that conform to the NFPA 70E standards.

Every safety manager's top priority is to provide a workplace free from serious safety and health hazards, ensuring that the workplace is fully in compliance with all applicable standards, rules, and regulations in order to maintain safety in their manufacturing facility. The VeriSafe™ Absence of Voltage (AVT) tester is a new product that improves the electrical workers' ability to safely verify that the electrical panel is in a de-energized state, and thus maintenance work can proceed.

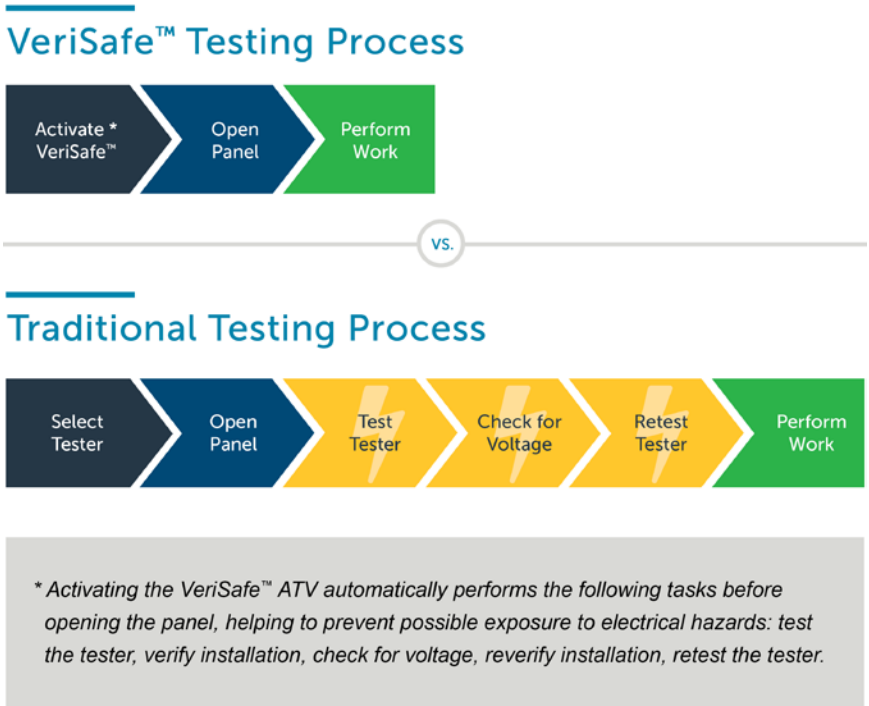
By meeting the standard for electrical safety in the workplace, Panduit's VeriSafe product is a shining example of a design-first solution that, at the point of work, drastically simplifies the voltage verification test to validate the absence of voltage.

The problem, that a qualified electrical worker would ordinarily expose themselves to the risk of electrical hazard in a complex and time-consuming manual procedure using hand-held electrical test equipment, is boiled down to a reliable, single push-button action.

Effectively, Panduit's VeriSafe Absence of Voltage Tester was generated through the 2021 edition of the NFPA 70E development process and Panduit research helped prompt new language in Article 120. The Panduit design is now listed as an AVT per UL 1436 and meets the newest requirements for permanently installed testers as cited in NFPA 70E 2021 120.5 (7) Exception 1.

What does this mean for Personal Protective Equipment? Decidedly, until a panel's circuit or its parts are tested and verified to be absent of voltage, they must be presumed to be energized, so wearing the appropriate PPE for the work environment until it is proven to be without voltage is mandatory. There's no sense in taking any chances, as capacitors, UPS systems and long cable runs can still hold a stored electrical charge. Additionally, it's important to verify absence of voltage because equipment can be mislabeled, changes to the electrical system may not

Why VeriSafe is Better



** Activating the VeriSafe™ ATV automatically performs the following tasks before opening the panel, helping to prevent possible exposure to electrical hazards: test the tester, verify installation, check for voltage, reverify installation, retest the tester.*

have been properly documented, and in cases of look-alike equipment, the wrong equipment is sometimes de-energized and locked out while the equipment that gets tested is sometimes still energized.

As part of the lockout/tagout process, VeriSafe is designed to verify the absence of voltage on low voltage electrical circuits. It can also be used to verify the absence of phase-to-phase and phase-to-ground AC and DC voltage. Its flexible design allows it to be installed wherever you would normally test for absence of voltage, typically on the line or load side of an electrical disconnect.

The Significance of PtD

The PtD case for electrical safety can be easily made. It has been well documented that using PtD principles is one of the most effective and reliable methods of protecting workers from electrical hazards. The point remains: thinking about safety in the design phase for all tasks that occur through the lifecycle of a product can be more easily (and often more economically) addressed by design solutions rather than relying on administrative controls like warnings, labels, training, written procedures, and PPE. Administrative controls and PPE, as opposed to design engineered solutions, will still protect workers from some electrical hazards, but de-energizing equipment needs to be a clear, reliable, and uncomplicated process when verifying absence of voltage. While the number of fatal workplace electrical injuries has fallen over the past 20 years, the trend with non-fatal electrical injuries is less consistent.

Determining voltage status before equipment is accessed and preventing direct exposure to electrical hazards is reliably achieved with an Absence of Voltage Tester from Panduit that also simplifies this process by automating the voltage verification process. It's important to point out that when establishing an electrically safe work condition, verifying the absence of voltage is only one step in the process—using an AVT is a part of the lockout/tagout process and is not intended to replace it.

The Role Management Can Play Today

Worldwide, industry implementation of PtD measures can still bear to use higher rates of adoption. In the plant, management's role in PtD principles is clear: establish a motivational force to promote designing for safety and begin to incorporate PtD products that protect workers into the overall plant safety program.

Most importantly, when safety is addressed in the design process, it is more effective and can prove to be a more economical safety play in the long run for the facility. When the benefits of PtD can improve worker productivity, create faster maintenance, and thus less downtime, then the facility—and everyone in it—wins.

The safety culture is changing. And responsibilities for safety will be shared across the facility among its workers, but preventing hazards, by design, is a priority for facility owners and the team responsible for maintaining safety management standards. New technology such as AVTs, thanks to PtD, will continue to play a big role in electrical hazard reduction strategies in plants that achieve improved safety and productivity for workers responsible for electrical energy.

6,000

FATAL ELECTRICAL INJURIES TO WORKERS IN THE U.S. BETWEEN 1992 AND 2013.

24,100

NON-FATAL ELECTRICAL INJURIES FROM 2003 THROUGH 2012.

U.S. Bureau of Labor Statistics (BLS)

Since 1955, Panduit's culture of curiosity and passion for problem solving have enabled more meaningful connections between companies' business goals and their marketplace success. Panduit creates leading-edge physical, electrical, and network infrastructure solutions for enterprise-wide environments, from the data center to the telecom room, from the desktop to the plant floor. Headquartered in Tinley Park, IL, USA and operating in 112 global locations, Panduit's proven reputation for quality and technology leadership, coupled with a robust partner ecosystem, help support, sustain, and empower business growth in a connected world.

For more information

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