Networking Solutions To Minimize Arc Flash Exposure

Randy Durick Director, Network & Interface Division, TURCK

Industrial environments present multiple safety challenges, including fire (electrical) hazards that require proactive safety measures to minimize potential risk. Arc flash hazards cause thousands of injuries a year, resulting in serious burns and in some cases, even death. With today's dependence on industrial networking and automation equipment—requiring frequent interaction with equipment inside panels that contain high voltage—the risk of an arc flash could increase significantly.

Arc flash is defined as a brief electrical explosion that is violent in nature and releases massive amounts of energy, with temperatures that can exceed 35,000°F. Currently, up to 80 percent of all electrical injuries are burns resulting from arc flash incidents. Arc flash explosions typically result from a low impedance/resistance to ground or a phase-to-phase fault in an electrical system.Arc flash occurs when there is an anomaly with an electrical enclosure usually concerning higher voltages—480 volts and above—that is common in industrial environments, such as automotive factories, automated assembly facilities and pharmaceutical plants.

When electrical equipment is housed in enclosures, there is a risk of igniting an arc flash anytime the door of the electrical enclosure is opened. Operator movement or contact with energized equipment within the enclosure, such as touching the equipment or accidentally dropping a tool inside the enclosure,could trigger an arc flash if the tool provides a low impedance to ground or causes a phase-to-phase fault of the service voltage. Therefore, in applications that require frequent access to equipment or controls, knowing and understanding the safety solutions available to mitigate these risks is crucial to continued productivity.

Arc Flash Safety Solutions

In order to combat arc flash risks, theNational Fire Protection Association (NFPA)developedNFPA 70E, Standard for Electrical Safety in the Workplace®. This code standard contains detailed instructions on electrical safety-related work practices,procedures and personal protective equipment (PPE)for safeguarding employees from energized electrical conductors or circuits.

Common factors that determine the severity of arc flashare the amount of current available to the arc flash, amount of exposure time and the distance between the arc flash andmaintenance technician. Therefore, eliminating or reducing these factors can protect personnel that must access automation equipment from the dangers of arc flash.

Oneeffective safety solution that manufacturers or designers may utilizeisdistributed I/O products that do not require the environmental protection of

electrical enclosures. This solution limits personnel exposure to arc flash hazards while maintaining the same level of productivity. In other words, remove the equipment that requires frequent access from the high voltage/current provided by the electrical service entering an enclosure.

Distributed I/O

While there is no solution that can completely eliminate the risk of arc flash hazards, there are solutions that minimize engineer, technicians and maintenance workers' exposure to such risks. Since there is a potential for an arc flash occurrence every time the electrical enclosure is opened, being able to take I/O equipment out of the electrical enclosure, which contains live voltage, and mount it in the field, minimizes risk exposure and ensues continued connectivity.

While flame-resistant apparel can provide workers with protection against arc flash, it can be cumbersome, time-consuming and laborious to put on.Further, engineers and maintenance workers require frequent access to I/O equipment and controls, so an efficient, safe method for personnel interaction is key. Mounting I/O equipment and controls outside the electrical enclosure enables engineers to access it without opening the enclosure.This not only ensures the same level of connectivity and communication, but also enhances operator safety.

For additional flexibility and enhanced application suitability, distributed I/O products are engineered for durability. Featuring IP ratings, such as IP67 and IP69K, these products can reliably perform in dusty and wet environments without fear of contamination, with some even withstanding heavy washdown conditions and total submersion. This allows networking equipment to be effectively removed from the electrical enclosure and exposed to the application environment without malfunctioning or causing other performance failures.

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