Safety Goes High-Tech

Smart devices promise to keep companies competitive

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‘The days of building safety into machines as an afterthought are numbered.’ By Gil Guajardo

Gone are the days of using “dumb” devices for machine safety. Back in the early days of machine guarding and machine safety, standard relays were the workhorses for protecting operators from the hazards associated with machinery. Relays did an admirable job of offering protection, but they had many shortcomings that would provide only marginal reliability. Primary among these was a lack of monitoring and self-checking. As a result, safety relays were introduced as a vastly improved method for providing machine guarding.
Safety relays quickly became the standard for providing a considerably improved and reliable means of achieving machine safety. Safety relays use an original design concept that takes advantage of a force-guided contact configuration that guarantees that the NC contacts are in the opposite position of the NO at all times. This special characteristic allows engineers to take advantage of this property when building safety circuits. The safety relay allows them to build monitoring into the circuit. Consequently, manufacturers used such relays to build “safety relay units” that allow a user to connect safety input and output devices quickly in a fashion that offers high reliability and improved safety. However, one of the many disadvantages for legacy safety relays, and their companion safety relay units, is that safety circuit design gets complex as additional safety relays are added. It is not unusual to find 10, 20, 50 or more safety relay units in a single control cabinet. Commissioning a machine that employs safety relays can take a marathon of time. In addition, gathering maintenance, trouble-shooting and diagnostic data is difficult at best when using safety relays.

Technical Renaissance

Today, new uses of established technologies and associated “functional safety standards” have kicked off a renaissance in machine safety techniques. These new machine-guarding technologies offer improved levels of safety with ease of use. Paramount among these new technologies is safety networks. Safety networks are a fieldbus technology that connects safety devices on a factory floor. Safety network controllers and safety PLCs are quickly becoming the norm when a machine builder

considers the options available when selecting machine safety. As a result, legacy safety relays and safety relay units are going the way of the dinosaur. Once an engineer designs a safety control system using a safety network controller with associated safety components, all future designs will utilize the same technology.
What's driving the proliferation of programmable safety controllers in the industry? A desire by employers to maximize production efficiency is one of the key reasons. Achieving maximum throughput, and hence profitability, is now included in the specification of many industrial machines. Employers are realizing that machines outfitted with "smart" safety devices do much more than protect employees from machine hazards. Now, more then ever, employers are using safety to work smarter and more efficiently. They realize that the benefits of smart safety devices go well beyond simply providing a safe work environment. Now, smart safety devices go a long way toward optimizing productivity. In other words, safety is seen as a beneficial tool rather than an obligatory hindrance and the cost of doing business.
Other reasons for the increasing use of safety networks are many, but let's discuss the ease of implementation. The effort and time required to design and build a safety system using a safety network are considerably reduced. Along with this, potential mishaps are significantly decreased while productivity is increased.
Another reason is the availability of safety information. Using a network safety device accommodates a simple way of accessing safety information including status, maintenance, diagnostics and error history data. Together these data allow all individuals associated with the machine to have a quick and efficient method for quickly understanding its particular state.

Continuous Improvement

Such data provide many advantages including ease of troubleshooting, unprecedented predictive maintenance and increased machine safety reliability, along with status information and history communications that make possible the concept of "continuous improvement." The possibility of continuous improvement lends itself to actions that allow the engineer to configure the safety aspect of a machine as a mechanism for optimizing machine productivity while offering unparalleled safety protection for the machine operator. These types of benefits are just not possible using legacy safety relays. The days of building safety into machines as an afterthought are numbered. Safety networks are quickly spreading in all industries and becoming the rule rather than the exception.
However, this message needs to be communicated now. Safety standards in the U.S. have been revised to clearly indicate that electrical/electronic and programmable electronic safety related systems are now eligible to be used in many of today's advanced safety system solutions. But, the message has not easily propagated throughout the industry. According to the 2002 edition of NFPA, an electronic logic (hardware or software) system, as well as the communication network or link that complies with 9.4.3 and 11.3.4, will be permitted. Similarly, other U.S. safety functional safety standards, such as paragraph 6.4 of ANSI/RIA R15.06-1999, allow for software- and firmware-based controllers to be used in place of hardware-based types. Why should smart and programmable safety devices be

important to machine builders and employers that implement these machines? The main reason is companies that do not utilize these types of smart safety devices will soon find themselves lagging behind the competition. To be competitive, it is a smart business decision to use smart safety devices.

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