Evolving Robot Safety Standards

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It has been said that the only constant in life is change. Several aspects of industrial safety standards are changing (evolving, really) and require constant monitoring and a bit of common sense to keep current. Technological advances and alternative guarding methods are being devised every day. The fact is if a potential work place injury can be identified, companies should be doing everything within their power to eliminate the opportunity. A great place to start is by conducting thorough Risk Assessments and referencing current standards and regulations.

But what standards and regulations apply and where do you find that information? OSHA? ANSI? ISO? Industry trade groups, consultants, or insurance companies? Companies promoting safety products? The answer is yes in every case. A wealth of knowledge is available at your finger-tips by conducting online searches. Some of these standards and regulations are free (OSHA guidelines), and some are available for a nominal fee (ANSI RIA 15.06 and EN-ISO 13849-1). A great amount of information is available by scouring safety suppliers websites, signing up for sponsored webinars, attending industry seminars/conferences, signing up for training courses, and asking industry association experts. But any way you look at it, compliance is required.

OSHA reports that Machine Guarding (machines, general requirements, general industry; 29 CFR 1910.212) consistently falls in the top ten most frequently cited OSHA standards violated in any given year. Add to that myriad regulatory changes occurring and you have some real potential for confusion and uncertainty. In addition, the numerous designs associated with industrial robotic applications together create the need for regulations and standards written to provide guidance in applying safety devices and control system products properly.

Regulatory Changes

RIA 15.06-2012?

Not too far off in the future is the revised and ratified version of the RIA 15.06 Industrial Robot Standard. This new standard will reference ISO 10218-1,2:2011 which addresses robot systems and integration. The new RIA 15.06 will no longer be exclusive to the U.S. and is written to be compliant with international standards already in place in Europe. This new standard will require better hazard identification and mandate risk assessments requiring validation of the safety solutions. The new RIA 15.06 standard will also mandate designs that incorporate protective measures for the robot cell, the operator, and provide for proper training.

Some of the biggest changes we will see in the new RIA 15.06 Industrial Robot Standard has to do with safety rated motion and allows for advanced programmable safety devices to be utilized. What this means is software will now be allowed “safety-rated” control of various aspects of the robots function. For example, programmable safety controls will now be allowed to limit the area in which the robot operates and the speed of robot motion. This is a departure from older versions in that programmable safety controls were not allowed. Thanks to technological advances in safety controls, these long over-due applications can now safely be implemented. In the past, engineers designing these systems guarded for the maximum space, speed, and load of the robot. Thanks to these changes alone, the physical footprint of new robot cells should be shrinking. When coupled with the proper point of interaction safety device, further floor space savings could be realized.

Additionally, the risk assessment methodology will require the use of EN ISO 13849-1 specifications which, as you read on, will require validation of the safety systems and all components. Fence positions, heights, and locations may be altered and other details are yet to be finalized, but it is safe to assume all will make for a much safer manufacturing environment.

Migration from EN 954-1 to ISO 13849-1 and EN 62061

One of the biggest changes occurring in 2012 is the migration from EN 954-1 to ISO 13849-1 and EN 62061. This has been coming since 2007 and has been put on hold first in 2009 and extended to 2011. Approval of this harmonized standard was a hotly contested fight, however, it is now here to stay. Best practices and market-ready solutions already exist.

ISO 13849-1, when broken down to the basics, provides a “clearly” defined set of rules to follow when designing the safety system as applied to industrial machine control systems. It was made necessary by advances in technology for safety control systems and methodology. Officially it is defined as “Safety of machinery, safety-related parts of control systems, general principles for design.”

The advantages of 13849-1 over EN 954-1 is the fact that it is much more quantitative, applies common sense, and forces you to validate your safety system where as EN 954-1 was conceptual and only required you to apply safety devices (controls) properly specifying non-programmable, out-of-date technology. Let’s face it — our increasingly complex manufacturing processes are forcing more complex systems required to monitor their safe operation and keep machine operators safe. Automated processes, robotics, and even time-tested processes all require considerable attention to ensure those processes can proceed both efficiently and safely. EN ISO 13849-1 will ultimately provide for a much safer manufacturing environment because it accounts for the holes that were starting to show in the older standards being replaced.

In addition to better hazard identification and analysis and allowing for the use of

advanced control systems, EN ISO 13849-1 and EN 62061 also introduces us to the Performance Level and Safety Integrity Level classifications. Most safety personnel are familiar with the term Control Reliable. Control Reliable was easily translated to a Category 3 or 4 (per EN 954-1) that provided regular or constant monitoring of the safety system. We now have Performance Levels of a through e and Safety Integrity Levels of 1 through 3. Unfortunately, these do not always correspond directly to the older classification system.

Overall, EN ISO 13849-1 is an improved, more comprehensive safety specification. By adhering to its tenants, the manufacturing environment will be safer and properly guarded machines will be better documented for the long run.

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