

Safety in the Robotics Industry



Jeff Fryman

PS: Describe your position as director of standards development for Robotic Industries Association (RIA).

Jeff: I am responsible for the development of national and international robot safety standards at RIA, among other robot-related standards. I am also responsible for planning and hosting our annual National Robot Safety Conference, as well regional seminars and in-house training programs.

PS: How are robots defined, and which industries make the most use of them?

Jeff: An industrial robot is an automatically controlled, reprogrammable multipurpose manipulator, programmable in three or more axes. It can be fixed in place or mobile for use in industrial automation applications. The phrases *multipurpose manipulator* and *three or more axes* differentiate an industrial robot from sophisticated complex fixed automation and from other types of robots, such as service robots and humanoid robots.

Historically, robots have been most used for welding applications, but material handling applications are quickly overtaking the lead in how industrial robots are used. The automotive industry is still the leading user of industrial robots by quantity, but many new and innovative applications are emerging.

PS: What types of occupational hazards can robots pose to workers?

Jeff: Industrial robots present a singular occupational hazard: the effects of being struck or crushed by the motion of the robot. Robot systems, the application and associated equipment, present myriad hazards relating to the process, tooling and what the robot system is actually doing.

PS: According to RIA, the North American robotics industry increased by 20% in 2012. Did this lead to an increase in occupational incidents and injuries? What are trade groups such as RIA doing to raise awareness of robot safety in light of the increase in robotics use?

Jeff: The continued increase of industrial robot use has definitely not resulted in an increase in occupational incidents or injuries. Robot-related injuries remain very low and are not measured as a separate incident aside from industrial (typically manufacturing) incidents.

RIA has promoted safe use of industrial robots since the first national robot safety standard, ANSI/RIA R15.06, was published in 1986. This year marks the 25th anniversary of RIA's annual National Robot Safety Conference, a multiday program featuring various speakers and presentations of successful robot installations. RIA also offers individual classes on robot safety and risk assessment.



PS: How is the standard, Control of Hazardous Energy—Lockout/Tagout &

Alternative Methods, ANSI/ASSE Z244.1-2003 (R2008), used in the robotics industry?

Jeff: The Z244.1 standard is important to the robotics industry as a supplement to the OSHA regulation for lockout of hazardous energy (29 CFR 1910.147). Many tasks associated with an industrial robot require that power (hazardous energy) be available to move or jog the robot arm. OSHA 1910.147 requires that this hazardous energy be controlled by locking it in an off or deenergized state. The Z244.1 standard provides guidance on when the OSHA exception to lockout for "routine, repetitive, integral to production" actions can be applied. Using the alternative measures for personnel safety described in R15.06 allows for a safe work environment when zero energy lockout is not possible.

Jeff Fryman is director of standards development at Robotic Industries Association (RIA) in Ann Arbor, MI, which he joined in 1996 after retiring from the U.S. Air Force. During his 21 years as an Air Force aircraft maintenance officer and program manager, he gained experience managing international programs that involved technical training, support and development. Since joining RIA, Jeff has helped develop U.S. national consensus standards, and he has served as secretariat to several ANSI and International Organization for Standardization (ISO) committees. He conducts training programs on robot safety and risk assessment, and has presented papers at seminars in the U.S. and around the world. Jeff is vice chair of the ANSI Z244 Committee on the Control of Hazardous Energy, a member of the CSA Z434 Technical Committee on Robot Safety, the CSA Z460 Technical Committee on Machinery Lockout and Hazardous Energy Control and the UL 1740 Standards Technical Panel for Robot Safety. He is also project team leader for the revision of ISO 10218, the international robot safety standard under ISO TC 184/SC 2.

Hotlinks

ANSI American National Standards Institute www.ansi.org

ASSE American Society of Safety Engineers www.asse.org

ISO International Organization for Standardization www.iso.org

NFPA National Fire Protection Association www.nfpa.org

RIA Robotic Industries Association www.robotics.org

PS: What other standards are used in the robotics industry, and are any new ones in development?

Jeff: Many voluntary national and international consensus standards are used in the robotics industry. The NFPA 79 and 70E standards are essential for safe electrical compliance in the U.S. As mentioned, Z244.1 is used, as are standards for marking, color selection and all of the standards related to specific machines that robots may interface with or service.

PS: What is the status of draft international standards for robotics safety?

Jeff: A new 2012 edition of the national robot safety standard (R15.06) will be published soon. This document is a national adoption of the international standards ISO 10218-1 and ISO 10218-2, which were published in July 2011. The international working group is currently developing additional in-

formation and guidance on the use of a new method of collaborative operation for industrial robots using power and force monitoring. This guidance (ISO TS15066) should be published in the next year before the revision cycle for the ISO 10218-2 starts. A new international standard is planned for nonindustrial robots used for personal care. Other ISO working groups are exploring safety requirements for mobile and medical application robots.

PS: What areas of robotics do you believe could benefit from greater use of safety standards?

Jeff: The proliferation of nonindustrial robots in various market segments continues to be a subject of interest for standards developers. A significant challenge for standards developers is keeping current with proper safety guidance for ever-changing new technologies.

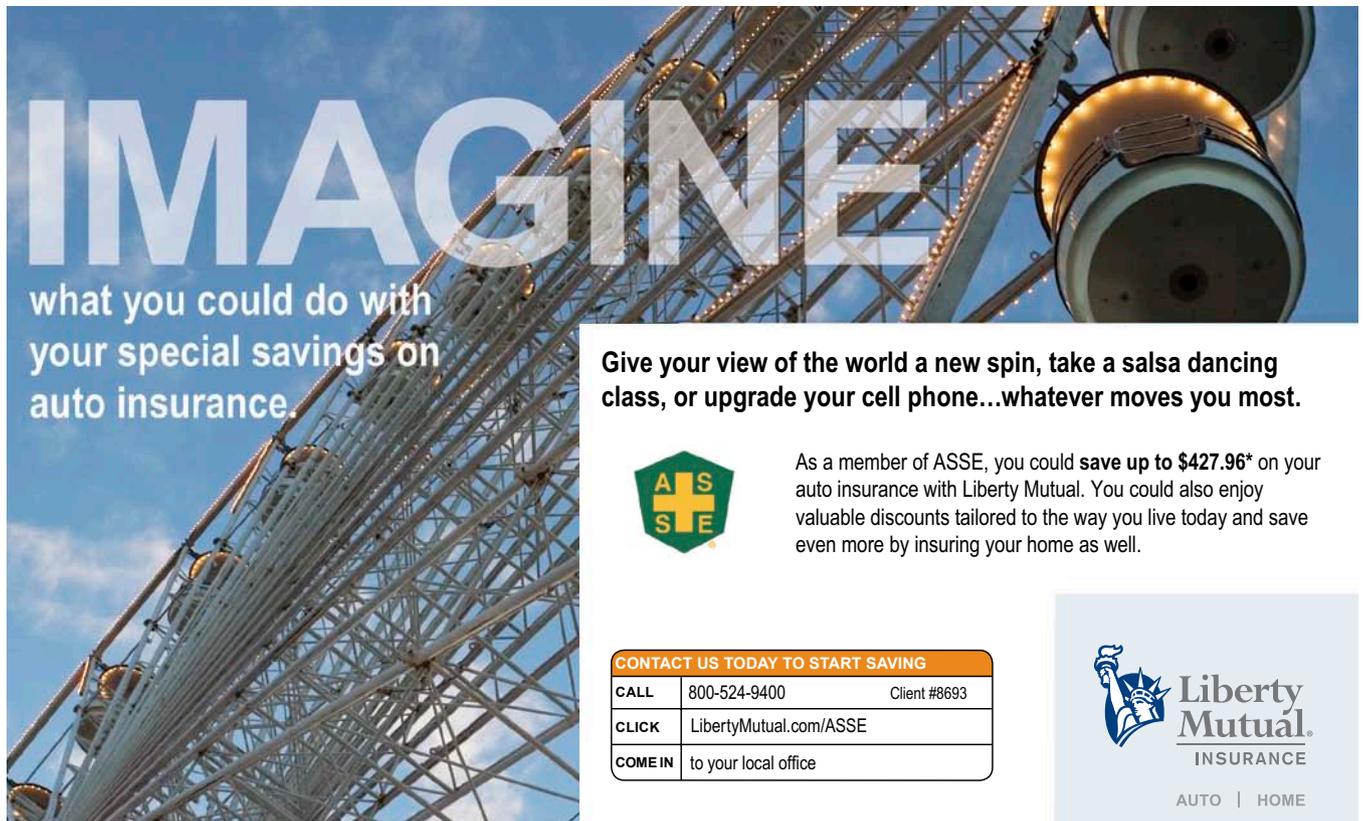
PS: Does the robotics industry incorporate prevention through

design (PTD) concepts in its robot designs to prevent injuries to workers?

Jeff: Technology development in industrial robots centers on the PTD concept. The entire new use of collaborative industrial robots is allowed because of the development and implementation of safety-rated features built into new robots and robot systems. These integral features help ensure worker safety without additional external safeguarding.

PS: How has occupational safety in the robotics industry improved in the past 5 years?

Jeff: Occupational safety has improved because of the continued outreach programs offered by RIA. The proper use of industrial robots frees workers from performing repetitive and hazardous tasks. Proper robot system design that follows the guidance contained in the voluntary standards ensures that this excellent safety record will continue.



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