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Why the Ergonomic Standard A10.40 is the Future of All Standards

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We in the safety profession have our egos and sometimes our politics. Sometimes egos and politics can be a problem in governing, as we have seen in the United States Congress. Egos and politics can get in the way of solutions, and these egos and political problems have interfered with progress necessary in the development of standards. Many dedicated safety and health professionals want to put their own "spin" values or technical expertise into a standard and some of them want the standard to facilitate and enhance their own professional standing. A dose of humility might be in order when it comes to standards development in the future. My experience at OSHA in industry and then in the private sector as a small businessman has opened my eyes to some common problems that occur with the development of safety and health standards, some of which have nothing to do with the standards themselves.

Experience working on different sides of issues has resulted in a perspective that includes: 1) There are serious problems with many current standards that specify action on the part of the employer or user; 2) No standard is perfect and there is no room for flexibility when human protection is involved; 3) The process of developing a standard is necessarily about compromise; and 4) Successful standard promulgation means everyone gets about half of what they want.

Standard development is a frustrating activity, but one that can make a real difference for the people in the workforce when the standards are simple, straightforward, and workable. This can be accomplished when the experts leave their politics and egos at the door and open their minds to the fact that most of the safety standards today are directed at humans, not equipment or materials.

Good results can happen, as with A10.40 (Ergonomics in Construction), when the group keeps its focus on safety issues and practical approaches to solving difficult human problems. Those of us on the committee were told that it would be impossible to pass an ergonomics standard after the difficult time ANSI had previously had with their "ergo" standard (Z365) and OSHA's well documented political battle on ergonomics between the Clinton and Bush administrations. The members of ANSI A10.40 took a different approach. Our approach involved compromise, participation of all the "shareholders," and most importantly, a performance approach to ergonomics where we never lost sight of the benefits an "imperfect" performance-type standard could make for the construction industry. All of us felt we had a "win-win" situation in that both the construction industry and the construction worker would benefit from a simple, sensible, and flexible document. Injuries could be prevented and claims could be reduced. We had the benefit of working concepts already used by a major construction industry insurance carrier (Zurich), as well as a performance-type standard introduced by the Corps of Engineers. Every single person that worked on that standard should be proud of their work. It took courage to proceed in the face of an extremely negative political climate. Rather than spending time writing a difficult and

technical ergonomics standard incorporating vague concepts such as “action triggers” (found in the proposed OSHA ergonomics standard), we focused on a simple performance-language approach that everyone could understand. In recent years, OSHA has adopted this same approach. Today when OSHA issues a new standard, an attempt is made to write it in plain and simple language and also as a performance standard.

The Problem with Many Current Standards

There are a number of things wrong with many of our current standards. They are written like contracts with the industry and include technical and sometime legal language that dictates the exact methods to be used and specifications which must be followed. Although these standards might be workable when they are designed solely for equipment and materials, they are lacking in the area of human protection. The National Electrical Code (NEC) is perfect for electrical systems and equipment but not helpful when it comes to human interaction with those same systems and equipment. OSHA recognized this problem years ago when they developed the “Safety Related Work Practice Standard,” which deals with what humans need to know to avoid electrical danger. Specifications standards have several major problem areas: 1) Technical specification standards do not adequately consider the human factor, i.e., don’t wear conductive apparel; 2) Technical specification standards place responsibility away from the powerful parties in a position to implement policies and procedures to incorporate the standard in the culture of the industry; 3)Technical specification standards fail to allow flexibility for different problems and solutions; and 4) Technical specification standards do not include elements that allow for the development of safety awareness within the scope of the organization that will use them.

We can look at these problems individually:

1. The human factor. An example is the guardrail standard. This standard dictates that the guardrail height must be 42 inches, or more recently with increased understanding of this problem, 39 to 45 inches. This standard may be based on the anthropometry of the human condition, but, if followed, this standard will not protect very tall people or deal with situations where humans use ladders or scaffolds around guardrails. If someone blindly follows the standard and doesn’t consider the human considerations, they could create a hazard or a misunderstanding regarding what constitutes compliance. Obviously, the guardrail would need to be made higher or some other fall protection used to protect the tall people or people on ladders or scaffolds, but this is never addressed in a specification standard. This same problem occurs with all specification standards when used to protect the humans. Good examples of this same problem are everywhere in the specification standards for fall protection. It would be better to simply say, “Protect people from falls.” Many technical experts react to this simple performance language in a negative way because they complain that the standard has not taught the employer how to prevent falls, and the safety and health person may not be able to discuss all the possibilities of fall prevention. This is a more serious problem than might at first be evident, because not only does the specification standard fail to protect, in my opinion, but also it prevents the employer or other parties from thinking about and solving the fall protection problem. If they just blindly follow standards, they will and do run into real problems, and those of us in the safety and health profession will be constantly telling them, “These are minimum standards; you have to go beyond them to get safety or compliance.” This creates frustration and confusion among those covered by the standards.

2. **Responsibility**. Technical specification standards imply that an expert must determine what is safe and healthful, but what is really important is integrating a system within the organization that holds everybody responsible. If safety and health only happens when experts are around, then the

organization has a real problem. Performance standards that hold the entire organization responsible for safety that encourage involvement at every level of the organization. It is never enough to simply identify and correct a hazard. The question is always what problems within the organization allow the hazard to exist.

3. **Flexibility**. Flexibility allows for improvements and builds on experience. We expect the employer to develop safety and health expertise, to have a safety and health committee, and to have a safety and health program, but we don't allow them to develop the muscles to actually solve safety and health problems where they need to be solved; at the workplace. Almost everybody agrees that the foreman or supervisor level is the place to focus on to avoid problems but we rarely teach these people how to think critically about these safety and health problems. We just hand them a bunch of specification standards that are confusing, may not be fully protective, and might even be dangerous.

4. **Awareness**. You can never have awareness of a culture of safety and health when it is a technical expert who is primarily responsible for the programmatic efforts. With technical specification standards, the people who need to use or be protected by the standard have the problem that they may not understand the standard or lack the knowledge or experience to understand why the standards were formulated or how they should be implemented. It is possible that there was not a good reason to formulate them in the first place. The performance standard as exemplified by the "Standard for Musculoskeletal Disorders in Construction" solves this problem and is an example for other standards. This simple performance- or task-based standard demands that the employer and employees examine the problem and provides sources of information where a solution to the problem is developed with internal expertise. In this way, the same problem is not solved over and over again because the culture exists to solve the problem continuously.

History of Standards

The history of standards involves engineers, lawyers, and safety professionals writing rules and the development of specifications, for the most part, to protect property, which were too often based on arbitrary concepts of protection and rarely included the human factor. One of the first problems OSHA had after being established in 1970 was to find standards for compliance officers to enforce. What they found were Fire Codes (NFPA), the National Electrical Code (NEC) and other codes which were not designed for human protection. What they did was to use these specification standards to enforce a new law that was ironically a performance-type standard. The new OSHA law was "To (as far as possible) prevent accidents and injuries which could cause death or serious physical harm." This performance standard was so perfect that it continues to be used by OSHA to cite employers in areas where there is no specific standard. Imagine if this "general duty clause" was the only standard! OSHA would then be required to cite the employer for programmatic violations, which instead of just correcting an individual hazard would require the development of systems to identify and correct all the hazards. All the specification standards which were available at the time of OSHA's beginning in 1970, which were promulgated for enforcement, did little to consider the development of programmatic solutions, the human anatomy, or behavior. Since Heinrich, these had been considered the biggest problems in the evaluation and prevention of accident and injuries. (**Herbert William Heinrich** was born in 1886 and was a safety pioneer from the 1930s. As an Assistant Superintendent of the Engineering and Inspection Division of Travelers Insurance Company, he published a book called *Industrial Accident Prevention, a Scientific Approach*, in 1931. He developed Heinrich's Law, which stated that in a workplace, for every accident that causes a major injury, there are 29

accidents that cause minor injuries and 300 accidents that cause no injuries. He demonstrated that many accidents share common root causes involving human behavior.)

After OSHA was established in 1970 there was a renaissance in the understanding of the role of the human factor, the safety professional, and the individual in solving the safety and health problems. Rather than trying to solve every problem with a specification standard (i.e., 42-inch guardrail), there was deeper thinking about how to actually protect the workers from falls, and the idea of the performance standard was more fully understood and developed. The first standard besides Section 5 (a) (1) of the OSHA Act called the "general duty clause" having a component of the performance concept may have been Hazard Communication Standard, which did not dictate how to protect workers from health hazards specifically, but instead outlined guidelines which, if followed, would protect and inform workers of all health hazards. This was followed by the exceptional Process Safety Management Standard (PSM) which recognized, after the Bhopal, India, accident (which in 1984 caused the death of at least 2,259 workers), that catastrophic failure could only be prevented with a systematic approach and a performance approach to the problem. Safety and health professionals began to notice that the problem in these highly hazardous industries was often related to the interaction of humans, and often contractors, working with highly hazardous chemical processes. The cause of these catastrophes was not often a violations of some technical requirement, but much more likely some programmatic failure or human failure.

In July 1991, I wrote an article entitled "OSHA's Voluntary Protection Program—A Safety Management Approach for the 90's" which was published in *Professional Safety* magazine. Those 90's seem like a long time ago, but in that article I identified the concept that violations of safety and health standards fell into certain categories that were beginning to be used for the purposes of citations. Employers who failed to exercise responsibility in the areas of: 1) Management Commitment and Employee Participation; 2) Workplace Analysis; 3) Hazard Prevention and Control; 4) Safety and Health Training; and 5) Training for Contractors could suffer the consequences of OSHA enforcement. These performance -type categories were being utilized to both dictate and evaluate performance, not just to identify hazards. At that time, it was possible to see the beginning or an approach for standards writers to write performance, task-based standards. A violation of standards was a violation of one of these basic building blocks of safety, which include the analysis of risky tasks and identification of potential solutions. When these building blocks were missing within a safety program, safety hazards and accidents and injuries would be the result. If no one was checking for machine guarding, then machines would be unguarded. In other words, when ABC Company fails to demonstrate commitment, analysis, control, and proper training for all parties, the result is hazards, danger and liability. There is no need to instruct the employer in every details of what must be done to eliminate this and future hazards within the workplace. That is the employer's programmatic responsibility and may be left to their discretion. It is the safety professional's job to show evidence that one of the basic building block requirements is missing and that it is a serious problem.

There are so many advantages to this approach, but the biggest is that the employer is in this way actually required to fix the problem. If a machine is unguarded, it is not enough to just guard the machine; the employer must examine the program's basic activities and find out what is wrong with the program that allowed the machine to be unguarded. It's not so much "guard the machine,", as it is, "whose responsibility is it to guard the machine?" If we spend the next 30 years merely identifying and fixing hazards, we will make as little progress as we have made since the 90's.

Fall Protection

Fall Protection is one of the best examples of deep trouble within standards. What is the magic number? Is it 4 feet as in general industry? Is it 10 feet as with scaffolding? Is it 6 feet as in general construction? Is it 15 feet as in steel erection? It is hard to have any credibility, in my opinion, when your standards are inconsistent and not based on actual science. These fall protection standards even discriminate against certain workers. Why a construction worker would not be afforded the same protection height as a general industry worker in an important question. The answer is they should not be allowed different heights for fall protection and the solution can be in a performance standard similar to that found in the ergonomics standard. Because of the dynamics of falls and the physiology of the human body (heavier on top), and the forces of gravity and type of fall, even falls at ground level should be avoided. A proper performance standard for falls would have to include potential protection from all falls at any height. In other words, look at falls and determine what you can do to prevent all of them, and here are some references based on science and experience that you can use to formulate a plan and take reasonable actions to prevent these falls. The current state of the art for falls doesn't even differentiate between fall arrest and fall protection. Obviously fall protection is much more protective than fall arrest and a hierarchy should be established. Any idea that it is just as good to stop a fall after it occurs than to prevent it before it happens is silly. The state of the art in industry today which involves, in some cases, providing personal fall protection systems and devices when actual fall protection is a real possibility, is wrong-headed and needs to be remedied with a real performance-based fall protection standard.

Actual Science

There is much more work that needs to be completed in utilizing the scientific methods for the development of standards to assure that standards are valid and reliable. Validity means that the result of the standard for protection can be proved using statistical methodology. In other words, we implemented the standard and here the results can be seen, and they are statistically significant. This is also an important indicator that the standard is measuring what it is supposed to measure. The second test of reliability is that we have to look at the effect of the standard again and again and we continue to see the same results. Whenever a standard is used, these concepts are the guide to determine if the standard is doing any good. However, when constructing the performance standard such as ANSI A10.40, these issues are removed from the problem. The user of the standard simply is required to conduct a task analysis to determine if there is a potential problem and then is pointed in the direction of the available science (mostly on the Internet) to determine possible solutions to prevent injuries and illnesses. The user of the standard is not evaluated by science, but by their effort to identify and prevent the hazard.

Levels of Performance

The performance standard expects results. The results are simple, eliminate falls, eliminate health hazards, and eliminate causes of musculoskeletal disorders. These are fine goals and there may or may not be reasonable solutions to achieve such goals. It is up to the safety and health professional and the standards to afford the industry the information they need to make reasonable assessments and provide them the options for potential action and solutions. What the performance standard cannot do in to dictate levels of performance. There are many reasons for this. One is that levels of performance change under various conditions; another is that they become outdated as with PEL or TLVs for health. Probably the most important reason to avoid

these levels of performance is because we can never agree on which ones are the right ones. The question for the performance standard is always whether there was a reasonable level of activity attempting to evaluate and control the hazard. It is never the question of reaching some exact level of performance. Imagine an OSHA where every citation that is written was based on performance criterion such as 1) Did they attempt to look at the problems and the solutions? 2) Did they train? and 3) Did they implement policies and procedures rather than citing the company on the basis on not meeting some arbitrary number?

Ergonomics

Ergonomics involves the complex interaction between humans, equipment, environment and the workplace. The A10.40 committee which developed the Musculoskeletal Disorder Standard realized that because of the critical human involvement with the problem, we must take a performance approach to outlining for the employer the task analysis for looking for the problem and then supplying a non-mandatory Appendix (which can be reevaluated continually, at least every 5 years at ANSI) and updated with current information that helps the employer find important solutions to the human and ergonomic problems. Instead of telling the employer what they have to do to comply or to avoid loss, citations, and litigation, we are telling them about the problem and letting them know where then can go for the solutions. We imagined that construction employers did not wish to be told exactly how to do their jobs safely and ergonomically, but instead want simple steps to evaluation the tasks conducted on their jobsite for potential problems and then pointed in the direction of reasonable solutions available on the Internet and in guidance from many other sources. This has the advantage of placing the ability to solve complex site-specific ergonomic hazards internally.

This standard was not passed without difficulty. The standard process began in 2004 with a statement that it was dedicated to a programmatic approach requiring the identification of potential high-risk hazards and proper training for workers. An original vote took place in September of 2004 and 70 percent of the members voted yes, with every member of the A10 committee voting for the first time in A10 history. After the vote, attempts were made to answer negative ballots and a one-month reconsideration period began during which members could change their votes. After a contentious month, the final tally failed by 3 votes. During 2005 the standard was rewritten to accommodate critics, including the removal of the word “ergonomics” and the standard being called “musculoskeletal problem reduction” in place of ergonomics and adding a note that the mere presence of risk factors may not constitute a problem. Additional changes included adding a note that the standard should not be used for enforcement purposes, and that there is not complete agreement regarding the causes or solutions of musculoskeletal disorders in construction. We also added a list on non-occupational contributory risk factors. In 2006, the revised standard was re-balloted with 77 yes votes and only 15 no votes. However, negative voters submitted 67 pages of comments. These comments were addressed (with much unhappiness) but the ballot was recalculated in May through June and the standard was confirmed. Then there were the appeals. Five major trade associations appealed the standard on the basis that 1) There was no scientific basis for the standard; 2) The committee did not follow due process; 3) There was lack of consensus on the committee and no good-faith effort to resolve comments; 4) The standard will lead to more litigation; and 5) The terms were not properly defined. The three-person panel of independent judges heard the appeal on May 1, 2007, and a unanimous decision was issued on May 25, 2007. They concluded that the appeal was “without merit” and “non-persuasive”. Another appeal occurred at the ANSI level on February 8. 2008, and on March 13, 2008, at the Board of Standards Review, and was rejected; and one final appeal occurred on July 16, 2008, which was also rejected. There were a lot of politics, and many

people do not know that OSHA actually requested to be removed as a member of ANSI A10 because of the passage of this standard. OSHA had refused to have their name associated with ergonomics.

What is in A10.40 that is So Good?

The scope is simple and applies anywhere there maybe risk factors. Not too many definitions; this is a place where a standard can get bogged down. This standard is short and to the point, identifying risk factors and some tasks that are known to be a problem. The last section gives the construction employer an approach to solve the problem, and the rest of the standard including all the technical information is in the appendix, which provides information and tools to allow any construction employer to do something about the problem. Compromise, Compromise, compromise was the answer in getting passage of this important standard. It was difficult for opponents to justify their claims that they were somehow disenfranchised from the process when many, if not most, of their comments were adopted.

The Safety Professional

One of the great problems for the future is deciding what the roles of safety and health professionals are in modern industry. In the past, the safety professional had all the answers and would "inspect" and decide what was right and what was wrong. Today the safety professional must be a person who knows where to go to get the answers. He or she is a coordinator, finding the human and financial resources to solve the problem. One person cannot possibly have all the expertise needed to solve the safety and health problems at a plant or construction site. To assure the place is safe and healthful, the safety professional of the future must know where the expertise and resources exist in the world (many times on the Internet) and put together reasonable solutions and information rather than dictating solutions or giving orders. Following the example of the ANSI's Musculoskeletal Disorder standard, we can see a path to changing our attitudes about standards, making them more relevant for the industry we serve.

Future

The idea that standards can be written for human protection that will specify exactly what must be done to achieve safety may become an outdated concept. Specifications standards such as ASTM and some ANSI standards for equipment and materials are excellent but are not that helpful for the protection of humans. Just as the 42-inch guardrail standard will not protect every individual under various conditions, many of these specification standards will not protect individuals in every situation which exists in construction, and they will not allow the employer the flexibility and understanding to develop their own site-specific programs and solutions. Every task and tool is different and presents multiple problems for the workers and the safety and health professionals. The future is to teach the people doing the work to do a simple assessment of the danger and give them easy access to the tools that offer possible and reasonable solutions. This is what was accomplished in the A10.40 Musculoskeletal Disorders in Construction (Ergonomics) standard, and this is what needs to be accomplished in future standards. This could be the future of all standards and should also be the future of OSHA, ANSI, ASTM and any organization attempting to solve the safety and health problem when humans are involved. The day of engineers and lawyers specifying the solutions may have had its day. Today we must offer the employer the help and guidance they need to solve their own problems. There is still much resistance to this concept from those who want to "specify" solutions or who have their careers, politics, and sometimes egos associated with doing specific testing and recommendations for

solutions. We must educate those in our profession that it is not as important to have the correct solution as it is to educate and provide tools for people who must act in the reality of the world to produce construction and industrial activity in the most successful and productive manner.