Addressing the Needs of the Heavier Worker in Fall Protection

In this interview, Randall Wingfield, president of Gravitec Systems Inc. and chair of the Z359 Accredited Standards Committee (ASC) on Fall Arrest and Protection, explains how those in fall protection are addressing the needs of the heavier worker.

Randall Wingfield is founder, president and CEO of Gravitec Systems Inc., a firm that offers fall protection education and training, engineering systems design, industrial rescue, design and development of courses, training and engineering and consulting in systems design and equipment purchases. He has been involved extensively in the continuing development of national and international standards for fall protection equipment and training, and he is president of the International Society for Fall Protection, Chair of the ANSI Z359 Committee and past vice chair of the Canadian Standards Association Z259 Committee. Wingfield is a member of ASSE's Puget Sound Chapter.

Q: Give a brief overview of your professional background and responsibilities.

A: As an officer in the military, I was responsible for designing and teaching courses in mountaineering, rock climbing and winter survival. Later, I used these skills to start a mountaineering company. The transition from recreational climbing to industrial fall protection was natural, and I founded Gravitec in 1986. The company specializes in fall protection and rescue.

Q: With respect to fall protection, how is a heavier worker defined? How often do the criteria for defining heavier workers change?

A: Typically, we use the term *capacity* when referring to workers' weights in standards writing for fall protection equipment. The current capacity weight range given in the Z359 Fall Protection Code is 130 to 310 lb. If we look at the upper range, 310 lb is the maximum capacity for a fully equipped (tools and clothes) worker. Most people in the industry define workers who weigh more than 310 lb as *heavier workers.*

The criteria for defining capacity have not changed since 1992, and the Z359.1 standard has remained constant. We have discussed going beyond the 310-lb range, but since we are governed by science and available data, the committee is holding to that capacity range as is.

We recognize that the North American population is getting heavier and that we may need to exceed 310 lb while taking into account energy absorption, clearance requirements and ultimate protection of the heavier worker. We are at the limit of what science can offer.

Q: What is being done to protect workers over the 310-lb capacity range?

A: Fall protection equipment manufacturers are producing harnesses, personal energy absorbers and other associated equipment with an increased capacity range, in some instances, as high as 440 lb. Each manufacturer addresses this issue individually in its product line. For example, we see ranges of 375, 400, 420 and 440 lb among different manufacturers. Manufacturers have taken it upon themselves to decide the appropriateness of their equipment for use beyond 310 lb.

Most 310-lb workers and their employers assume that this equipment will perform for heavier workers in the same way it performs for someone who weighs 310 lb or less. Thankfully, the strength of the equipment is not in question, however, the maximum arrest force a heavier worker is subjected to in the event of a fall is cause for concern. We also do not know the physical effects of a fall and suspension on the heavier worker.

Another cause for concern is the conversion factor used to determine equipment capacity. The human body absorbs

Standards Developments continued on page 26

continued from page 25

some of the energy generated from a fall. To account for the human body's energy absorption, a conversion factor of 1.4 has been used for years. When fall arrest equipment is tested with a 220-lb rigid test weight, the conversion factor of 1.4 is multiplied by the rigid test weight to determine the equipment capacity. The sum is 308 lb and is rounded up to 310 lb. However, testing conducted by Gravitec and a few equipment manufacturers to evaluate the conversion factor has revealed that the 1.4 multiplier is not accurate. A 1.1 conversion factor is more accurate. Proposed ANSI standards have accepted and adopted the new 1.1 conversion factor, so test weights will increase resulting in more rigorous testing.

OSHA has a clause (in its construction and general industry regulations) stating that workers in excess of 310 lb can use fall arrest systems provided that OSHA's testing criteria and protocols are modified appropriately to provide proper protection. Equipment manufacturers apply this clause when testing their equipment for heavier workers, then purport the equipment as OSHA-compliant. Unfortunately, OSHA does not name a maximum capacity, so we are seeing equipment provided for workers up to 440 lb. No one is really guaranteeing that this is acceptable. OSHA refers to the equipment manufacturers' test data, and equipment manufacturers state that the equipment meets OSHA requirements.

ANSI does not recognize equipment that exceeds the 310-lb capacity range. This equipment would also not be approved under the Z359.1 standard. Yet, some equipment is labeled as ANSI-compliant even though it was designed and tested for a capacity exceeding 310 lb.

Q: You have served as chair of the Z359 ASC for Fall Arrest and Protection since 2005 and you also chair three different Z359 subcommittees. How has the Z359 ASC addressed heavier workers in the Z359 standards?

A: The Z359 ASC has established the maximum capacity range at 310 lb for all standards. Any equipment with a capacity higher than 310 lb is outside the scope of the Fall Protection Code.

Q: Weight is a sensitive issue for many. How are employers approaching this issue, and how can employers encourage heavier workers to use proper fall protection equipment without it seeming like a personal attack?

A: Employers have no clear, definitive direction on what the maximum capacity range for a heavier worker should be. ANSI says one thing, OSHA has an allowance for going beyond 310 lb and manufacturers are approving their equipment with no commonality. We must educate employers so they can better identify what job their workers will perform, how immediate the rescue will be and whether they have a totally engineered system.

Most heavy workers believe that they have the same level of protection as their lighter coworkers because that is what most have been told.

While ANSI is not the law, those employers who choose to comply with ANSI standards must understand that once you exceed the 310-lb capacity range, you are no longer working with ANSI-approved equipment.

Should the heavier worker at height find alternative employment? This is not possible in many cases and it affects the heavier worker's right to work. Although everyone has a right to work, I am not sure that putting a 440-lb worker in a fall arrest system is the right thing to do.

Other protection methods must be evaluated. Guardrails, fall restraint, covers or safety nets can be evaluated and may be able to work instead of fall arrest systems.

Q: Has any testing or research been conducted for workers weighing more than 310 lb?

A: My company recently conducted some testing for workers exceeding 310 lb. We worked with volunteers from a local employer who was debating whether to go beyond 310 lb. We tried to identify demographics beyond 310 lb, associated health risks and fit sizing of the harnesses to determine any modifications the manufacturers may have made for the heavier worker. We also examined suspension issues after the event of a fall to learn what happens in suspension trauma and to find out if any significant research or studies have been conducted in this area. We found none.

We did not actually drop a heavier worker during testing. Volunteers were suspended less than 6 in. in the air. Emergency medical technicians (EMTs) monitored the volunteers, and we spoke with physicians and prescreened the volunteers prior to testing. We had three EMTs, one on staff and a standby ambulance equipped to monitor volunteers' heart rate, pulse and blood pressure.

However, testing was discontinued prior to a maximum suspension of 15 minutes. The study's focus was not suspension trauma; we wanted to identify harness fit sizing by looking at harness design, upper-body support, subpelvic support, self-rescue ability and harness adjustability.

The tests revealed several things. First, more thought and design must go into the harness for the larger worker. Several of the harnesses would not fit and encroached on the neck. They did not have extra padding. Other than more webbing, harnesses for heavy workers are no different than conventional harnesses. Second, the physical effects due to suspension happen sooner with heavier workers. Increased blood pressure, heart rate, sweating, extreme discomfort and nausea occurred with the heavier group significantly sooner than lighter workers. Lastly, these tests indicated that more testing should be conducted.

The World Health Organization says the average adult male height in North America is 5 ft. 9 in. At this height, individuals weighing 310 lb or more and having a body mass index in excess of 40 are considered morbidly obese. In fact, 98% of people more than 310 lb are morbidly obese. A body mass index in excess of 40 is acceptable only when height-related and 310 lb at this height is considered morbidly obese. People in this weight category often have comorbidity illness and a host of other associated illnesses.

Even if we can design specialty harnesses, connecting means and engineering systems to address clearance requirements and protect heavier workers, we still have a person working at height, and if that person falls, s/he is still suspended in a harness and waiting for rescue. It seems as though we are protecting heavier workers' jobs and not the worker. It all comes down to education and trying to understand the differences in providing appropriate equipment. We must decide whether workers are fit enough to work at height.

Q: Have manufacturers been modifying their products to accommodate heavier workers? As a distributor of fall protection and rescue equipment, has your company noticed any trends in this regard?

A: Manufacturers have stepped up and performed some testing for their harnesses and lanyards to ensure that the equipment's capacity can handle greater worker weight and is strong enough to support the fall. Regrettably, we found no manufacturers designing harnesses or equipment specifically for heavier workers. Most manufacturers just include additional webbing to accommodate heavier workers. Manufacturers have no

standards to follow; they conduct testing to ensure that strength is there.

We must be much more sophisticated in equipment design. If we decide as a community or workforce that we must protect heavier workers, we need to design appropriate equipment for them that takes everything into account. We have a knee-jerk reaction to the heavier worker (e.g., adding webbing instead of designing specifically for this demographic).

Q: How can employers best protect workers who weigh more than 310 lb?

A: They must be aware that they are exceeding the capacity range for ANSI-approved equipment. Once they go beyond 310 lb, they rely purely on the equipment manufacturer and their testing.

Q: Based on your company's experience, what do heavier workers think of the general fall protection equipment that is currently available? Do they feel it can be improved?

A: Heavier workers who participate in our training are surprised to learn that the equipment they purchase does not take their size and fit into consideration.

In our experience, most heavy workers believe that they have the same level of protection as their lighter coworkers because that is what most have been told. In reality, the maximum arrest forces are normally higher, deceleration distances are greater, suspension tolerance is lessened, rescue is much more difficult and the risk of injury due to a fall is increased because of weight.

I think fall protection equipment for the heavier worker can be improved. I believe we can go past the 310-lb capacity—the question is how far. I believe there will be more equipment customization. The harness in particular must have more padding, increased support in the subpelvic and a larger range of adjustability. Specialized energy absorbers are also required for the heavier worker.

Employers push manufacturers to produce equipment that supports weights in excess of 400 lb, but on what do employers base their decisions?

UL Standards Update

Standard Nationally Adopted: Safety for Electrical Apparatus for Explosive Gas Atmospheres

UL's Standard for Safety for Electrical Apparatus for Explosive Gas Atmospheres—Part 1: Flameproof Enclosures (BSR/UL 60079-1-200x) has been nationally adopted. This provides the sixth edition of the Standard for Safety for Electrical Apparatus for Explosive Gas Atmospheres—Part 1: Flameproof Enclosures "d" (UL 60079-1), which when published, will adopt the sixth edition of IEC 60079-1. This new edition is a complete rewrite of text to coincide with the IEC text and contains the U.S. differences.

Intrinsically Safe Apparatus Standard Under Revision

UL's Standard for Safety for Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Division 1, Hazardous (Classified) Locations (BSR/UL 913-200x) is under revision. Proposed revisions include correlation with permitted protection techniques in Article 506 of the National Electric Code.

NFPA Standard in Development

NFPA's new standard, Hazardous Materials Code (BSR/NFPA 400P-200x), is in development. This standard applies to the storage, use and handling of the following hazardous materials in all occupancies and facilities:

1) corrosive solids and liquids;
2) flammable solids;
3) organic peroxide formulations;
4) oxidizers—liquids or solids;
5) pyrophoric solids and liquids;
6) toxic and highly toxic solids and liquids;
7) unstable (reactive) solids and liquids;
8) water-reactive solids and liquids.