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Delivering Safety at Height in the Workplace

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Introduction

Once the third-leading cause of work-related death across all industries in the USA, falls have surpassed workplace homicide to become the second-leading cause after motor vehicle crashes. Empirical data and research suggests that past and present approaches to traditional fall protection have not significantly reduced the number of fall incidents in either construction or general industry in the USA.

A search through the U.S. Department of Labor, Occupational Safety and Health Administration (US DOL/OSHA) website (http://www.osha.gov/pls/imis/accidentsearch.html) reveals that most of the fatal falls that occur in the workplace are the result of the decedent worker not utilizing any means of fall prevention or arrest. In a disturbing number of cases the worker is actually *wearing* a safety harness, and perhaps even a lanyard, but is not clipped in to anything. Unprotected falls from elevated work surfaces frequently result in the individual's impacting the ground, most often resulting in death.

Although fall prevention and protection has been repeatedly addressed by OSHA, which has suggested methods such as elimination or substitution of work, use of engineering controls, administrative controls, and the appropriate use of personal protective equipment (PPE) to control hazards, occupational deaths and injuries have not followed the same trend as other workplace accidents. Falls continue to be a leading cause of death and injury in the workplace.

A common concern noted in many fall accident investigations is that traditionally accepted fall protection methods are simply not feasible in certain situations. In addition, misjudgment of a hazardous situation is the most common type of human error involving falls, accounting for about one third of all the accidents.

This presentation will explore safety at height in light of various types of fall protection methodology used, including fall arrest, positioning, and rope access. The potential cost benefit of requiring higher levels of competence, supervision, management and personal levels of responsibility in work at height will be explored and contrasted with the idea that all hazards can be "engineered out" of a situation.

The Managed Fall Protection Program

Developing and implementing a comprehensive, managed fall protection program is the most effective method to identify, evaluate, and eliminate (or control) fall hazards through planning; ensure proper training of personnel exposed to fall hazards; ensure proper installation and use of fall protection and rescue systems, and implement safe fall protection and rescue procedures.

The hierarchy of fall protection, from most- to least-preferred methods, includes eliminating fall hazards, passive fall protection, fall restraint, fall arrest and administrative controls.

The first step in developing a managed fall protection program is for the employer to appoint a Program Administrator who has sufficient knowledge, experience, training and authority to evaluate, manage, and direct the fall protection program. The Program Administrator is responsible for identifying and documenting fall hazards, and for eliminating or controlling fall hazards to which employees might be exposed.

Fall Protection Plan

Fall protection and post-fall rescue procedures should be written and maintained for every location where an active fall protection system is used to control a fall hazard, and Authorized Persons must be informed about fall hazards at jobsites owned or operated by employer, as well as at any locations where an authorized person may be exposed to a fall hazard (regardless of ownership). While either formal or informal methods are acceptable to inform employees of fall hazards, formal methods are preferred for traceability and verification purposes.

Authorized persons must be provided with continuous fall protection wherever they might be working under the authority of the employer. Ideally, all employees should be trained to recognize fall hazards and to avoid exposing themselves to fall hazards without fall protection.

A written preplan should include validity dates, which should be specific and short-term enough to ensure reconsideration at reasonable intervals. Regardless of dates included in the plan, it should be updated whenever work practices, equipment, or other aspects of the program change.

Policy Statement

Every employer should develop a Policy Statement that provides general goals and guidance for a managed fall protection program and emphasizes management's commitment to providing a safe workplace for employees exposed to fall hazards. This statement should be considered carefully for your workplace, and should reflect a specific approach.

An employer should always be willing to take every reasonable precaution to protect the health and safety of employees. This might include equipping, training, and preparing employees to manage fall hazards, as well as a requirement that employees shall use effective fall protection systems when working in any situation that presents a foreseeable exposure to a fall hazard.

Fall Hazard Survey

A fall hazard survey report should be prepared to identify all fall hazards associated with the employers workplace/practices. Each fall hazard to which an authorized person may be exposed should be included in the plan and considered individually. Where a common hazard may exist in multiple locations, each location should be considered separately. Similarly, where multiple hazards exist in a single location, these should be considered individually as well as collectively. Finally, the report will identify one or more methods to eliminate or control each identified fall hazard.

A fall hazard survey report should address such details as the type of fall hazard, the basic configuration of the hazard (graphic/ drawings), the exposure rating (high, medium, low), the frequency of the job, the height of the potential fall, the suggested corrective solution(s), and the type of rescue equipment (if required) to be used.

When many different types of hazards are addressed, the survey should generate a comprehensive list of the fall hazards from highest priority to lowest priority. This will assist in arranging for solutions to those hazards that present the greatest risk of exposure and potential for injury

Environmental factors should also be addressed in the survey wherever they may affect installation, use, inspection, maintenance and dismantling of any fall protection system. For example, this might include the presence of sparks, flames and heat; chemicals which may be hazardous to the authorized person or to the fall protection system; electrical hazards; environmental contaminants; sharp/ abrasive surfaces; moving equipment and materials; unstable and slippery walking/working surfaces; unguarded openings; climatic factors, and foreseeable changes in any of these conditions.

In the fall hazard survey report, risk factors should be established to assist in the ranking of fall hazards so that they might be addressed in order of priority.

Fall Hazard Mitigation/Resolution

For every fall hazard that is identified in the Fall Hazard Survey, a plan (or plans) for managing the hazard should be developed.

The best means of mitigation is always Elimination or Substitution. Can the hazard or hazardous work practices be removed or can a substitute work method be used? If so, describe specifically in the plan how the hazard will be eliminated, including diagrams as appropriate.

If elimination of the hazard or substitution of work methods is infeasible, the next preferred choice is that of Passive Fall Protection. Can the hazard or hazardous work practice be isolated or separated from employees or others? This might be accomplished with barriers, guardrails, protective covers, etc. Again, if Passive Fall Protection is used, describe the means of doing so specifically in the plan, including diagrams when possible.

Rope access methods are also sometimes considered to be a form of Passive Fall Protection because a properly used rope access system simply involves connection of the user to a vertical surface (rope), thereby preventing a potential fall; in fact, a rope access system, involves two independent, redundant systems that can be alternated between primary suspension and backup safety. However, it should be noted that rope access systems are not for the uninitiated, and these require special training and skills for maximum safety.

Work Positioning and Restraint systems are always a good choice for safety, in that the ultimate goal is to prevent any significant fall. Where a restraint system is used, the maximum surface slope should not exceed 4:12.

Perhaps the least desirable method for preventing a catastrophic fall is that of using a Fall Arrest System. Where a Fall Arrest system is used, a maximum free fall of no more than 6 ft should be permitted, with a maximum arrest force no greater than 1800 lbf. Sufficient clearance should be provided to keep the authorized person free of obstructions.

Based on the Fall Hazard Survey for each particular identified hazard, and the Fall Hazard Mitigation procedure selected, describe in detail and diagram the fall protection procedures to be used.

Consideration should be given to the number of workers who will be at the specific site simultaneously, and how many of these might simultaneously be exposed to this fall hazard. Safety provisions must be established nearby to protect persons not on the work team, and equipment should be selected and put into use specifically as it relates to the type of protection selected.

Anchorages and Anchorage Connectors

Anchorages are arguably the most critical part of any fall protection system. The Plan should describe and diagram all anchorage locations, noting permitted direction(s) of load.

Any Certified Anchorage must be rated to at least two times the maximum potential arrest force, times the number of Authorized Connections. Non-certified anchorages must meet the requirements noted below:

Restraint:	Minimum 1000# (4.5kN) x # Authorized Connections
Positioning:	Minimum 3000# (13.3kN) x # Authorized Connections
Rope access:	Minimum 5000# (22.2kN) x # Authorized Connections
Vertical Lifeline:	Minimum 5000# (22.2kN) x # Authorized Connections

All Horizontal Lifeline Anchorages MUST be CERTIFIED by a QUALIFIED PERSON

The compatibility between anchorage connectors and anchorages must always be considered when designing or selecting an anchorage and anchorage connector. When an anchorage connector is situated where the gate is serving as a pivot, the forces applied can be increased by a factor of more than two. Many connectors are incapable of supporting this magnitude of load and the gate could fail.

Rope access

Perhaps the least understood method of protection is that of Rope access. This is unfortunate, since Rope access is also probably the most versatile and safest method of protection!

Neither rope access nor its cousin, Controlled Descent, are well-covered by existing OSHA regulation. Nevertheless, many companies have elected to go the extra mile in voluntarily following SPRAT's Safe Practices Guidelines and Certification procedures. Anecdotal experience tells us this is because following SPRAT's Safe Practices Guidelines gives them a work plan they can rely on, and utilizing Certified Technicians helps verify the worker's capabilities on an ongoing basis. Many employers who utilize these techniques can be very confused about compliance, however, and occasionally they are even "cited" for failure to use recognized Fall Arrest systems as defined in OSHA regulations.

By its strictest definition, any descent system utilizing rope is generically called a Rope Descent System; however, a Rope Descent System is not the same as a Rope access System.

Historically, a platform of any kind (including a seat) that is suspended from fiber or wire rope, and upon which a worker rests as primary suspension has been designated as a Suspended Scaffold. In a suspended scaffold system, it is the platform that is suspended, rather than the worker. The worker simply sits, or rests, on the platform. The mechanism for lowering and/or raising the suspended scaffold may be manual or powered, and independent safety is provided by a typical "fall arrest" system. This type of system is most often (appropriately) regulated as a suspended scaffold.

Conversely, a system wherein a worker is directly and integrally connected to a rope system for descent, ascent, and protection is really a "Rope Descent System". In a RDS the worker may utilize a work seat for comfort, but the work seat does not comprise the primary connection of the worker to the rope system. In a rope descent system the mechanism for lowering and/or raising the worker may be

manual or powered. A person using a rope descent system requires special training and skills, and should only be authorized to do so if they are certified as a Rope access Technician.

Numerous characteristics differentiate scaffolds from Rope access. A key difference is that scaffolds and even RDS (as practiced outside of rope access) utilize 'fall arrest' systems which operate as an independent and STATIC system. These fall arrest systems often utilize stranded (or “laid”) rope, which is not suitable for descent or ascent and therefore cannot be used as a redundant system. On the other hand, rope access employs a safety backup system that is also independent, but is actively utilized and completely interchangeable with the primary system. This permits, in certain maneuvers, use of a third connection or series of maneuvers to transition through the system so that the primary rope becomes the backup and the backup rope becomes the primary, yet always maintaining at least two points of connection.

Also, in rope access, technicians typically utilize two to three lanyards (in addition to the primary descent device and ascent devices) rigged with safety backup devices, rope adjusters, and/or connectors, that are interchangeably utilized to provide 200% connection, to provide stabilization and positioning, and to facilitate various rope access maneuvers. In fact, in certain transitions technicians often utilize primary ascent or descent devices as the safety backup device on the safety backup rope. Given these and numerous other factors, current fall protection provisions, which serve as a critical component of scaffolds, are not capable of performing as safety/backup systems used in rope access.

For example, to facilitate these rope access maneuvers and to keep safety lines free, tensioned, and properly oriented, a front of harness connection point is required. Further, rope access incorporates such special skills as appropriate use of knots, proper use of connectors such as carabineers, system rigging, edge protection, haul systems, belay, progress capture, load sharing anchors, horizontal lines and systems, and numerous other issues are not applicable to scaffolds, or even to RDS. The above noted Rope access aspects are not addressed by either the scaffold regulations or ANSI I-14, but are addressed by the Society of Professional Rope Access Technicians.

The equipment and systems utilized by rope access are based on the work to be performed and the specific needs of the project, and are too numerous to list in any prescriptive form. Therefore, an applicable, performance based regulation/standard is required to safely and efficiently guide pope access. Safe Practices requirements for rope access may be downloaded free of charge from WWW.SPRAT.ORG.

Rope Access in the Workplace

In a recent survey of 437 SPRAT Technicians, rope access was reported as being utilized in more than thirty different kinds of jobs. Some of the most common environments where rope access was reported as being used are shown in Figure 3.1.

It should be noted that in the survey respondents were allowed to select more than one entry, and although 68% of respondents reported using Rope access in conjunction with buildings, a total of 1617

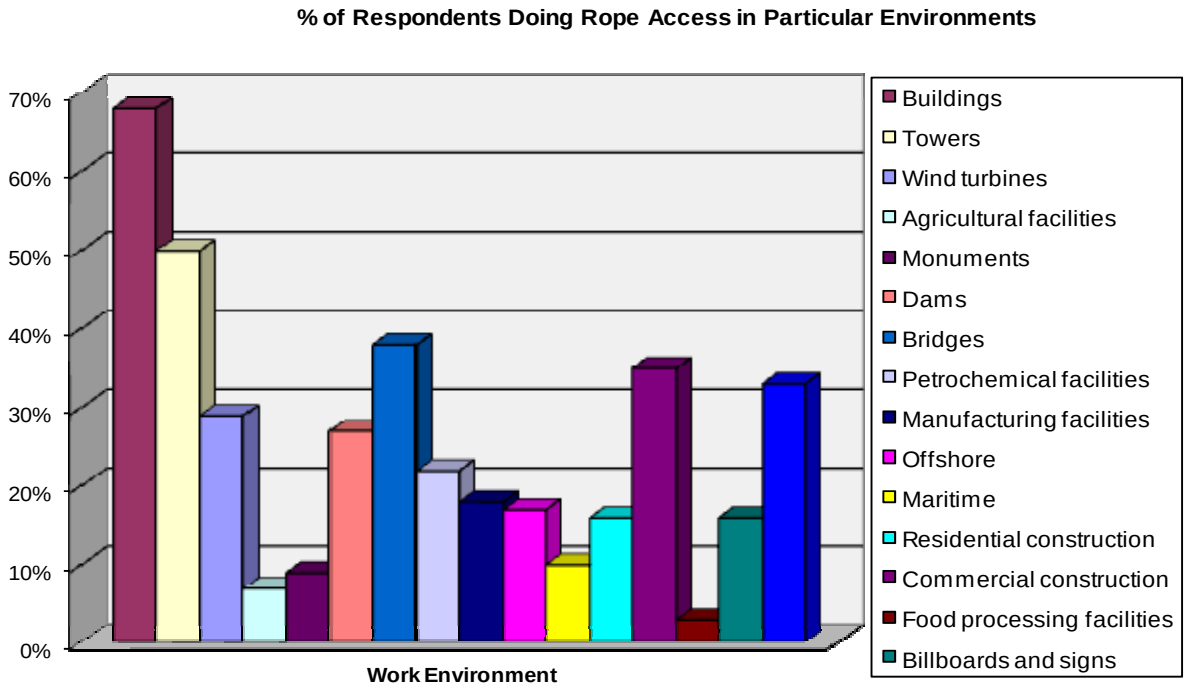

Figure 3.1

'selections' were made by respondents including all categories offered. Applications other than buildings were selected in over 82% of all responses, suggesting that rope access is an excellent choice in a wide range of applications.

Other applications of rope access reported as 'Other' included but were not limited to radar installations, mines, power generation facilities, entertainment rigging, theme park rides/attractions, geologic features, arborculture, masts, antennae, water towers, avalanche control work, power lines & utilities, museums, smoke stacks, pressure pipes, highway maintenance, raptor nest removal, government facilities, oil & gas exploration, cranes, refinery plants, ski gondolas, radio telescopes, challenge course construction, wharfs, quarries, and solar panel installation.

In order to prevent incidents, it is imperative that all users of rope access for height safety be required to be properly educated, equipped, certified, and maintain continuing education/training in their use of rope-based systems. Training is best verified through independent testing/verification of skills rather than measured in hours.

Employers in the USA and around the world are charged with a complex task of safely managing safety at height in a wide range of activities and industries. At no point in the history of the United States has this been more critical to the progression of our society than in this post-global recession. Companies and entire industries as a whole are actively working to find new ways to work more efficiently to make more progress with less (workers, money, time, resources, etc.)

Rope access provides many key tools in the form of innovative approaches to solving challenges associated with working at height.

Rope access should be considered as a viable means of access anytime it is an appropriate choice for a job, not just when it is only choice. Conventional access (such as scaffolds and fall arrest) should not be arbitrarily considered to be safer than rope access when the facts clearly do not support this opinion, nor should rope access be regulated the same as suspended scaffolds.

Users of these methods must learn to apply clear definitions to delineate suspended scaffolds from rope access, and work should adhere to specific performance requirements for maximum safety. All rope access systems must incorporate fully interchangeable backup systems, and requirements for training, certification, equipment maintenance and inspection, work pre-planning, responsible charge, continued education, and other key aspects of rope access should be adhered to.

Rope access as employed in industry today involves far more than descent of buildings, and is in fact the access method of choice for numerous inspections and maintenance of critical infrastructure and assembly. Rope access is a carefully planned and executed, wide-ranging application of equipment and techniques based on best practices taken from a wide range of applications (including rescue) that have been vetted and proven for many years. Rope access is recognized, effectively utilized, and sufficiently regulated or standardized all over the world. If the ultimate goal is safety, the option of rope access should be considered as a viable approach to work.