

Addressing the Issue of Compliance with Personal Protective Equipment on Construction Worksites: A Workers' Perspective

Rizwan U. Farooqui, Ph.D. Candidate,
Syed M. Ahmed, Ph.D.,
Kamalesh Panthi, Ph.D. Candidate
Florida International University
Miami, Florida

Salman Azhar, Ph.D.
Auburn University,
Auburn, Alabama

Personal Protective Equipment (PPE) can be a significant determining factor between an accident and safety on construction sites. Anecdotal evidence suggests that wearing the correct personal protection at all times is extremely important in reducing accidents and should be given high priority. According to recent statistics by Occupational Safety and Health Administration (OSHA), only 64% workers, on average, constantly wear the correct protection. The purpose of this paper is: (1) to report the current workplace PPE issues in the construction industry, (2) to investigate the causes of lack of use of PPE from a workers' perspective, and (3) to recommend solutions to address the issue of compliance with PPE. The primary data for this research was collected in person via a survey (questionnaire) from site workers on major building construction sites in South Florida. Data validation was done by site observation surveys. The major conclusions from the study are: Both organizational as well as worker commitment towards PPE compliance need to be improved. The following major reasons have been identified for PPE lack of usage from workers: uncomfortable/ poor fit, temperature discomfort/ too hot, reduced productivity/ hinder their ability to work more efficiently, not enough PPE for all, not enforced by employer, and lack of training on appropriate use. A major recommendation is that if PPE is to be used consistently as well as effectively, a PPE program should be implemented. This program should address the hazards present; the selection, maintenance, and use of PPE; the training of employees; and monitoring of the program to ensure its ongoing effectiveness.

Key Words: PPE, OSHA, Organizational commitment, Employee commitment, Compliance.

Introduction

Recent improvements in safety performance have taken place as a combination of efforts of owners, contractors, subcontractors, and designers. The owner's involvement has shown to favorably influence project safety performance by setting safety objectives, selecting safe contractors, and participating in safety management during construction (Huang and Hinze, 2006). Despite the dramatic improvements in safety that have taken place in recent decades, the safety record in the construction industry continues to be one of the poorest (Huang and Hinze, 2006) and the industry is consistently ranked among the most dangerous occupations accounting for a disproportionately large percentage of all work-related illnesses, injuries, and deaths in the United States (Center to Protect Workers' Rights, 2005). According to the National Safety Council, the economic impact of fatal and nonfatal injuries amounted to \$625.5 billion in 2005 (NSC, 2005)! Construction related injuries representing a substantial chunk of that number. The U.S. Bureau of Labor Statistics (2005) shows that construction's overall lost-days nonfatal occupational injury and illness incidences rate (239.5 cases per 10,000 full-time workers) has been higher than any other industry sector.

Organizations can improve safety by providing the necessary systems, tools and motivation. However, safety is implemented, in essence, by construction workers on work sites who indeed need to adopt adequate safety related tools, equipment and systems for the provision and control of work environment and human behavior (Farooqui et al, 2007). Personal Protective Equipment (PPE) is a key to personal safety at the worker level. Often overlooked and mostly considered as being only a minor player in the overall site safety, PPE can be a significant determining factor between an accident and safety. Anecdotal evidence suggests that wearing the correct personal protection at all times is extremely important in reducing accidents and should be given high priority. This is not to assert of course that safe work practices should be given any lesser priority.

Occupational Safety and Health Administration (OSHA) – the organization responsible for outlining safety policies and procedures, requires the use of PPE to reduce employee exposure to hazards when engineering and administrative controls are not feasible or effective in reducing these exposures to acceptable levels. Employers are required to determine if PPE should be used to protect their workers. The above OSHA policy somehow undermines the significance of PPE and lets the employers be the judge. This aspect has proven to be detrimental to safety in a number of cases when the workers have not been found wearing the required appropriate PPE and as a result suffering from accident. This is evident from the literature review and surveys conducted under this study (related in subsequent sections).

The purpose of this paper is three fold: (1) to report the current workplace PPE issues in the construction industry, (2) to investigate the causes of lack of use of PPE from workers perspective, and (3) to recommend solutions to address the issue of compliance with PPE.

Research Objectives and Methodology

The main objective of the research is to investigate the causes of non-use/ lack of use of PPE. A secondary objective is to look for possible solutions. The scope of the research is limited to collecting and analyzing the data from the perspective of construction workers. It is expected that the findings will aid in 1) identifying the root causes of lack of usage of PPE, and 2) developing strategies for improved PPE usage and hence improved safety performance.

To achieve the study objectives, the following research methodology was adopted. The study first developed the rationale of the need of PPE in the construction industry. This was done by critically evaluating the cost consequences of lack of use of PPE. This research was conducted through many different sources: books, electronic copies of books, scholarly journals articles, magazines, abstracts from safety conferences, safety databases, and websites. Following this, a questionnaire was developed for assessing issues related to PPE compliance, provision, and use. The questionnaire was used to collect data from construction site workers on major building construction sites in South Florida. Data validation was done by site observation surveys. Finally, the data was compiled, analyzed and conclusions drawn. Subsequent sections have been laid out appropriately to depict the methodology.

Need for PPE: Cost of PPE Non-Compliance

The Bureau of Labor Statistics (BLS) concludes that in the year 2006, the American construction sector was responsible for 21% (1226 in count) of all workplace fatalities across all industries, and 10.4% (412,900 in count) of all the country's nonfatal occupational injuries and illnesses.

Research shows that the major causes of construction accidents are related to human behavior, difficult work site conditions, inadequate use of protective equipment, and poor safety management, which result in unsafe work methods, equipment and procedures (Abdelhamid and Everett, 2000). In a recent survey by the Laborers' Health and Safety Fund of North America (2006), 40 percent of construction workers said "working while hurt" is a major problem. Many of the injuries that occur in the construction industry are due to the manual material handling that is required in the construction industry (The Eastman Kodak Company, 2004). As pointed by the U.S. National Institute for Occupational Safety and Health (NIOSH), material handling incidents account for 32% of workers' compensation claims in construction, and 25% of the cost of all claims (NIOSH, 2007). Use of appropriate PPE in a timely manner should help improve the safety scenario.

PPE refers to protective clothing, helmets, goggles, or other garment designed to protect the wearer's body or clothing from injury by electrical hazards, heat, chemicals, and infection, for job-related occupational safety and health purposes, and in sports, martial arts, combat, etc. There are different types of PPE related to construction. The most common being head, hand, face, eye, foot, and body protection.

To protect from head and neck injuries, a hard hat is required to be used. Road construction companies alone in the U.S. pay out approximately 19 million dollars more for head and neck injuries each year than it cost them to equip the entire workforce with hard hats (ISEA, 2008). Even though head protection may not protect from every potential blow, it can greatly reduce head injuries. High visibility apparel is another form of PPE that oftentimes is not exercised fully. Approximately 65 million dollars (ISEA, 2005) are spent on related injuries in roadway construction in U.S. Measures have been taken to enforce speed limits at work zones and to raise awareness among construction workers, but wearing appropriate apparel should not be underestimated.

Another common malpractice in relation to PPE is the lack of use of hearing protection when needed. It's common to observe construction workers wearing their hard hats, appropriate boots and gloves but no hearing protection around noisy operations. Hearing loss injuries are responsible for 14 million dollars spent each year (ISEA, 2007). "We believe that wearing today's high performance, comfortable hearing protectors; earmuffs as well as reusable earplugs, will protect against a vast majority of hearing loss injuries, adding immeasurable quality of life for those who use them regularly and their families over the course of a career" observed by the president of a major construction firm in South Florida.

Something as trivial as not putting on a pair of proper gloves is responsible for 48 million dollars each year (ISEA, 2006)! It is amazing how easy it is to put a pair of gloves on and yet workers have a difficult time doing so. Foot protection is another one that requires little to no effort. A pair of qualified boots is more than enough to reduce the chance of a foot related injury. It does not take much effort to wear the appropriate PPE when working, but still, only 64% workers, on average, constantly wear the correct protection (OSHA, 2007).

Observing the above data, it can be concluded that adequate, timely and appropriate use of PPE is essential as well as can contribute extensively to improving the safety performance of the industry. Hence this is an aspect that requires further insight, especially as to why an appreciable proportion of construction workers do not wear PPE. This diagnosis will be significant, in particular, towards developing strategic recommendations for improved usage of PPE in the industry. The research in hand aspires to do that.

Research Design and Methods

Following the literature review, a survey was designed with the objective to know directly from the people, who use the PPE more often, i.e. the construction workers, their perception, experience, and inputs on why usage of PPE is not working at its full extent in the industry. The questionnaire contained fifteen (15) questions grouped into four sections. The description of these sections is as follows; *Section 1*: background information about the respondent and the organization; *Section 2*: Management commitment towards PPE; *Section 3*: Worker responsibility and involvement towards PPE; and *Section 4*: Usage of PPE/ Understanding the Issues with PPE.

The primary data for this research was collected in person from site workers from twelve (12) work sites in South Florida. The research required the assistance of contractor management who provided their meeting rooms for worker attendance. The content of the questionnaire was explained to the construction workers in order to increase workers' understanding before filling in the questionnaire. The time for questionnaire filling was approximately 20 minutes. The questionnaires were collected after the workers duly completed them. Discussion with the workers was also done in order to better understand the issues and recommend possible solutions. Site observation was conducted on three (3) selected construction sites to verify the validity of the data collection. The observations were made on half day visits to each worksite. Based on the gathered information, quantitative analysis was performed and the results are discussed in the following section.

Analysis of Results and Discussion

Fifty four (54) copies of the questionnaire were distributed to the construction workers on the twelve (12) work sites. The response was highly encouraging and forty eight (48) copies of questionnaires were returned (mostly on site) complete. The return rate was 88.9%. Two (2) responses were invalid owing to inconsistency in the responses and were discarded. The remaining forty six (46) responses were included in the analysis and provided useful information for the survey.

The following sub-sections illustrate the major findings. In line with the format of the questionnaire, the results are reported in four sections. The workers' responses are indicated as a percentage of total responses.

Section 1(a): Responding Organizations Characteristics

Of the fourteen (14) construction companies asked to participate, nine (9) responded to the opportunity. This represents a response rate of 64.3%. The size of the participating companies was medium to large, with some employing as few as 1000 workers, and others as many as 3000 workers. The workforce and type of work of participating construction firms was primarily general building construction. The participating firms were primarily from South Florida. The average time that the companies had been in business was 22 years. Looking at the gender distribution of the companies surveyed, the percentage of male employees had a wide margin over female employees. The women population represented 3% of the total number of workers responding.

Section 1(b): Respondent (Workers) Profile

There were 82.5% of the construction workers over the age of 35 years. There were 27% of the construction workers who had worked less than 5 years on construction sites and 32 % of them had between 6 to 10 years of work experience. 8% of the construction workers surveyed were female workers. Table 1 summarizes the nature of project sites the workers were associated with, when surveyed.

Table 1						
<i>Respondent (Workers) Project Share</i>						
Project Type	Respondent Share (No. of responding workers)					Total (%)
	Condominiums	Office Buildings	Shopping Malls	Schools	Hospitals	
Mason	2	1	1	1	0	10.87
Carpenter	0	1	1	1	1	8.70
Electrician	1	0	1	0	1	6.52
Plumber	0	1	1	0	1	6.52
Framer	1	1	1	1	0	8.70
Welder	1	0	1	1	0	6.52
Steel Fixer	0	1	0	1	1	6.52
Laborer	1	1	0	1	1	8.70
Crane Operator	0	1	0	1	0	4.35
Heavy Equipment Operator	1	1	0	0	0	4.35
Painter	0	1	1	1	0	6.52
Roofer	1	0	1	0	1	6.52
Cement Finisher	0	1	1	0	0	4.35
Cladding Fixer	1	0	0	1	0	4.35
HVAC Fixer	0	1	1	1	0	6.52
Total (%)	19.57	23.91	21.74	21.74	13.04	

Section 2: Management Commitment towards PPE

In this section, six (6) questions were asked to evaluate contractor management's commitment towards PPE. The results are as follows.

1. *Does management indicate the statutory requirements for the provision of PPE in its site safety plan? (Yes/ No/ Can't Say)*

80% responded in affirmation. However, it is interesting to note that workers from 14% of the contracting organizations surveyed claimed that their management does not include provision of PPE as part of its safety commitment in their site safety plans. Although the proportion is low, it is quite alarming because this clearly indicates that some organizations do not have a strong commitment to worker safety in terms of defining the appropriate policies for provision of PPE. A few workers (3 workers i.e. 6%) indicated that they do not have an idea whether provision of PPE is an explicit requirement in the site safety plan or not. This either reflects a lack of worker commitment to understanding and acting on site safety procedures, or a lack of management commitment to appropriately communicate the site safety plan to their workforce.

2. *Does management maintain PPE facilities on worksites (whether adequate or inadequate)? (Always/ Often/ Occasionally/ No)*

Results indicate that contractor management generally strives to maintain PPE facilities on worksites in most of the cases (62%). This is a positive finding as to a general sense of contractor management commitment to PPE. However, it is important to note that almost 40% of the contractors do not consider maintaining PPE on worksites as their top most priority (26% do it often while 12% only do it occasionally) and there may be times in their projects where the required PPE is not available to the workers.

3. *Does management obtain a sufficient stock of carefully selected and appropriate PPE for each site? (Always/ Often/ Occasionally/ No)*

Results depict some interesting findings. Compared with the responses obtained for the extent of management commitment to maintaining PPE facilities on worksites (previous question), it is evident from above results that, amongst the contractors striving to maintain PPE facilities on worksites, a smaller proportion of contractors strive to ensure sufficiency and appropriateness of their PPE. For instance, 62% contractors put efforts to always maintaining PPE facilities on worksites but only 48% strive to make sure that the stock is adequate as well as appropriate. Moreover, even though all contractors maintain some kind of PPE support on worksites, 12% do not extend any efforts to ensuring the sufficiency and appropriateness of the equipment; while another 18% only extend this effort occasionally (the remaining 22% do it often). These results indicate a lack of management commitment towards PPE from an appreciable proportion of contractor organizations.

4. *Has management established an effective system for the issuance, recording and inspection of PPE and its replacement? (Yes/ No)*

68% workers responded affirmatively to this question. This indicates that almost one-third proportion of contracting organizations do not have adequate PPE management systems. Hence it is highly likely that the associated workforce, owing to inadequate and/ or inappropriate PPE, may be exposed to safety hazards. Moreover, this also indicates that almost one-third organizations lack a mechanism to inspect the appropriate use of PPE by their workers. This fact may allow many workers to work on site without having the necessary safety equipment on, and this may go as an acceptable worker behavior from the perspective of top management.

5. *Does your company provide training on the use of PPE? (Yes/ No)*

76% workers responded affirmatively to this question. This indicates that almost 25% contracting organizations do not provide PPE related training. Hence it is highly likely that the associated workforce, owing to inadequate training on PPE use, may be exposed to safety hazards. Moreover, this also indicates that almost 25% organizations lack a mechanism to develop a PPE culture amongst their workers. This fact, in particular, indicates management's lack of commitment to PPE in almost one-quarter of the organizations.

6. *Is there a procedure to monitor the PPE brought on-site by subcontractor workers? (Yes/ No)*

62% workers responded affirmatively to this question. This indicates that almost 40% contracting organizations do not monitor the PPE brought-in by their subcontractors. This indicates a lack of PPE policy from the contractors in terms of mandating the use of PPE on their worksites. Moreover, this also indicates that almost 40% organizations lack a mechanism to inculcate a PPE culture on their worksites. This fact, in particular, indicates management's lack of commitment to PPE in almost 40% organizations.

Section 3: Worker Responsibility and Involvement towards PPE

In this section, three (3) questions were asked to assess the extent of worker responsibility towards compliance and wearing PPE as well as their level of involvement in the selection and purchase processes for PPE. The results are as follows.

7. Do you feel you have a responsibility for compliance with PPE?(Major/ Minor/ Not Sure)

78% workers indicated that they have a major responsibility for compliance with PPE; 6% were convinced that it is not their major responsibility but rather the responsibility of the management to comply with PPE procedures; while the remaining 16% were not sure. The above results indicate a lack of consensus as well as poor attitude from about 20% workers as to accepting the responsibility for PPE compliance, which is indeed a major consequence of lack of management commitment and emphasis towards PPE.

8. Do you feel you have a responsibility for wearing PPE at all times?(Yes/ No)

Although 100% contractors provide some kind of PPE facilities on worksites, 38% of construction workers were not sure whether they have to wear protective equipment on the construction sites at all times. This reflects a lack of awareness and training as to the need, significance and responsibility towards wearing PPE.

9. Are you responsible for purchasing, selecting, influencing the purchase or selection of PPE? (Yes/ No)

Only thirty percent (35%) reflected that they had a role in influencing the purchase and selection of PPE. This reflects both the management lack of commitment towards involving workers in the PPE decision making process, as well workers' inappropriate attitude towards being involved in the PPE selection and procurement process.

10. Do you ask your supervisors for provision of appropriate and adequate PPE when not provided? (Yes/ No)

The survey revealed that 28% of the workers would not ask their contractor supervisors for provision of PPE (if not provided) because they were either not feeling the responsibility for compliance with PPE or were mobilized workers employed by subcontractors working on temporary basis.

Section 4: Usage of PPE/ Understanding the Issues with PPE

In this section, six (6) questions were asked to assess the extent of usage of PPE on work sites and to understand the issues with PPE lack of usage. The results are as follows.

11. Have you ever observed anyone in your organization failing to wear proper PPE in a situation when they should have been wearing it?(Yes/ No)

Alarming, 53% workers responded affirmatively. This indicates that in almost 50% of the organizations, failing to wear PPE when required is an acceptable behavior.

12. If you answered "Yes" to the previous question, was it investigated by management at anytime as to why wearing of PPE was not observed?(Yes/ No)

Out of the 53% workers who responded affirmatively to the previous question, only 28% indicated that it was investigated by management as to why wearing of PPE was not observed. This indicates a lack of PPE control mechanism in almost 25% of the organizations.

13. *Do you personally believe that wearing PPE can help you protect from work related injuries?(Yes/ No)*

82% of the workers believed that wearing PPE can protect them from work injuries and that in addition to being a safety requirement, wearing PPE is as well a legal requirement.

14. *Do you wear PPE as a habitual inclination? (Yes/ No)*

58% workers were reluctant to wear protective equipment.

Discussion on Reasons for not Wearing PPE: Workers' Perspective

When diagnosed for the Reasons for not Wearing PPE, the reasons ranged anywhere from “I don't know” to “I didn't think I needed it”. Based on the findings of the study, the researchers were able to compile a general consensus as to the reasons for not wearing PPE.

The number one reason why workers do not like to use PPE all the time is because it is flat out uncomfortable or does not fit right (58%). Having to work for 8 to 10 hours a day with something on that is not comfortable can take a toll on anybody and force them to take it off. When asked about exposing oneself to safety risk versus being comfortable, a worker commented, “I know that by taking my hat off I will be at a higher risk, but I would rather be there than uncomfortable for 8 hours.” The same reason for not wearing PPE came from the women workers as well. Although more and more women are taking on jobs that traditionally only men used to do, in the case of construction, this creates an issue because most of the safety equipment is tailor made to fit men and not women. They become frustrated that they cannot find something to fit them right, so they don't wear any protective equipment at all, hence increasing the risk of injury.

The workers also complained facing stress problem in wearing PPE particularly in hot, sunny weather, confined and poor ventilated areas (38%). Reduced work productivity, i.e. hindrance in ability to work more efficiently was also indicated a major reason for lack of use of PPE by the workers (34%).

Another common response was that PPE was either not available in ample quantity for all (24%) or was not enforced by the employer (18%). The latter is a little more disturbing because as a construction contractor as well as an employer, they should know better. Not only should the employer care for the well being of its employees but it is always more profitable to invest a little money into a safety program. In addition to not enforcing the use of PPE, employers also fail to make PPE easily accessible. Few workers noted that even though the employer tells them to wear their safety equipment and the workers want to wear it, sometimes there just isn't enough for everybody. This discourages the use because workers do not feel like fighting for PPE.

Few responses revealed that workers have not received training on the use of protection equipment (18%). This indicates lack of management commitment towards PPE enforcement. Other workers indicated that they have not accustomed themselves to wearing protective equipment during work operation (14%). There are other minor reasons workers don't wear their PPE, some of which include PPE not easily accessible from site of work task (12%), looking ridiculous with it on (8%), and not knowing it was necessary at the time (6%).

As a consequence to the above reasons, the statistic is that only around 65% of the time workers really are using their needed personal protection (OSHA, 2007). This is a staggering statistic that needs to be changed. Solutions to this problem can start by focusing on the major reasons why workers take PPE off: the top on the list being making the PPE more comfortable. Also, new innovative ways to get them to put it on should also be welcome.

Site Observation

To validate some of the survey findings, site observation was conducted on two construction sites. It was observed that while most of the workers were wearing appropriate PPE, few workers were an exception. For example, on one

site, few workers carried out breaking concrete work without wearing earplugs. It was ironic that neither any of the on-site contractor supervisors nor safety officers stopped the workers from performing the unsafe behavior.

It was observed that few workers on construction sites were reluctant to use personal protective equipment, despite the law requirement imposed on construction sites. On some sites, there were ample personal protective equipment provided, such as hardhats, protective gloves, goggles, masks and protective hearing equipment. Nevertheless, few workers (almost 25%) on the construction sites failed to wear these safety gadgets.

Conclusions

Organizational commitment towards PPE compliance needs to be improved. This is evident from a number of findings: 1) 14% of the contracting organizations surveyed do not include provision of PPE as part of its safety commitment in their site safety plans; 2) 40% of the contractors do not consider maintaining PPE on worksites as their top most priority and there may be times in their projects where the required PPE is not available to the workers; 3) 12% contractors do not extend any efforts to ensuring the sufficiency and appropriateness of the equipment; 4) A one-third proportion of contracting organizations do not have adequate PPE management systems; 5) A one-fourth proportion of contracting organizations do not provide PPE related training; 6) 40% contracting organizations do not monitor the PPE brought-in by their subcontractors.

Worker commitment towards PPE usage also needs to be improved. This is evident from a number of findings: 1) Although 100% contractors provide some kind of PPE facilities on worksites, 38% construction workers were not sure whether they have to wear protective equipment on the construction sites at all times; 2) Only 35% workers reflected that they had a role in influencing the purchase and selection of PPE. This reflects both the management lack of commitment towards involving workers in the PPE decision making process, as well workers' inappropriate attitude towards being involved in the PPE selection and procurement process; 3) 28% workers would not ask their contractor supervisors for provision of PPE (if not provided) because they were either not feeling the responsibility for compliance with PPE or were mobilized workers employed by subcontractors working on temporary basis.

The following major reasons have been identified for PPE lack of usage from workers, in descending order of criticality: 1) Uncomfortable/ Poor Fit, 2) Temperature discomfort, 3) Reduced productivity/ Hinder ability to work more efficiently, 4) Not enough PPE, 5) Not enforced by employer, and 6) Lack of training on appropriate use.

Addressing the Issue of Compliance with PPE – Recommendations on Possible Solutions

After gathering information from individuals regarding the use of personal protective equipment, and noting the commonalities associated with their responses as well as conducting site observations, the research team came up with some recommendations for addressing the compliance issues with PPE.

In an attempt to make the use of PPE more widely spread, an important suggestion would be to improve the level of comfort experienced when the PPE is being used. Comfort was an issue with many workers and can be addressed in a variety of ways:

1. A workers dexterity while working with tools and handling materials is important, and many complained of the bulkiness experienced when using large gloves. Available on the market are much smaller and form fitting gloves that provide both protection and a better fit.
2. Another issue was the workers concern for temperature. Solutions available include fabrics that are made from lighter materials and that enable to breathe more readily.
3. Head protection in the form of hard hats also received a bit of criticism. Some felt as though the head dress made them appear silly along with some discomfort when worn for long periods of time. Though a bit more expensive hard hats are available with a higher quality interior web and padding that would make the experience more tolerable. As far as their concern for how they looked, the group noted many different styles of hard hats ranging from those that took the form of a cowboy hat to those with professional team

logos. Allowing the employee to choose their style can give the employee the opportunity to express their individuality and personal taste, providing them with a feeling of appearing more stylish.

A reward or incentive program to the employees for consciously making an honest effort to wear their PPE can be another solution. Rewards would include a monetary gift or bonus added to their regular check for wearing their PPE or added time to their regularly scheduled vacation, while incentives might include a raise that would increase their weekly salary.

Training is another method of communicating the importance of safety to the employee. Safety training on the use of protective equipment should be conducted to the construction workers. The employer should not only provide the time and subject matter of the training but somehow should create an environment conducive to learning. The training program should include the application of PPE, its standard, suitability, and comfort to the workers. The workers should also learn PPE maintenance as part of their training.

Constantly stressing the importance of safety by providing short videos, statistics, and posted reminders everywhere can be another method of improving the PPE compliance. Contractor top management should demand that site safety managers should provide a short and specific overview every morning before the start of the day, and while doing rounds remind all those they come in contact with about the importance of safety and PPE.

Competition may be another useful method to increase compliance. Creating an environment where each individual is competing against another for some form of recognition or reward, a game so to speak, where each person is challenged by his or her peers to outperform the other may help a long way.

Increasing awareness among employees, especially those new to the field of construction, is extremely important. In addition to regular meetings and training sessions, this can be done through video and statistics of actual events pertaining to construction accidents.

The final option is enforcement, i.e. to have the employee comply with the use of PPE. Discipline is difficult, but at times necessary. The employee must be made aware that safety is part of the company's normal operating procedures, and that noncompliance cannot be tolerated because injuries or deaths must be prevented at all cost. Reminding the employee that their safety is a major concern for the company is extremely important for improving their level of commitment to safety procedures. Talking to them about OSHA's rules and regulations, the cost of injuries and down time and most importantly their own personal safety, will all help.

The bottom line – If PPE is to be used consistently, a PPE program should be implemented. This program should address the hazards present; the selection, maintenance, and use of PPE; the training of employees; and monitoring of the program to ensure its ongoing effectiveness.

References

- Abdelhamid, T. S., and Everett, J. G. (2000). "Identifying root causes of construction accidents." *J. Constr. Eng. Manage.*, 126(1), 52-60.
- Center to Protect Workers' Rights (2005). *Work-related fatal and nonfatal injuries among U.S. construction workers, 1992-2003*. Silver Spring, MD: Center to Protect Workers' Rights, 1-38.
- Farooqui, Rizwan U., Ahmed, Syed M. and Azhar, Salman (2007). "Safety Management Practices in the Florida Construction Industry." Proceedings of the Associated Schools of construction (ASC) 43rd International Conference, Flagstaff, Arizona, USA, April 11-14, 2007.
- Huang, Xinyu, and Hinze, Jimmie (2006). "Owner's role in construction safety." *J. Constr. Eng. Manage.*, 132 (2), 164-173
- ISEA (2008). International Safety Equipment Association Data. [On Line]. Available: http://www.safetysafetyequipment.org/workzone/wz_cost_head.html
- ISEA (2007). International Safety Equipment Association Data. [On Line]. Available: http://www.safetysafetyequipment.org/workzone/wz_cost_hearing.html

- ISEA (2007). International Safety Equipment Association Data. [On Line]. Available: http://www.safetyequipment.org/workzone/wz_cost_hand.html
- ISEA (2005). International Safety Equipment Association Data. [On Line]. Available: http://www.safetyequipment.org/workzone/wz_cost_hivis.html
- NIOSH (2007). *Simple solutions: Ergonomics for construction workers*. U.S. Department of Health and Human Services, DHHS (NIOSH) Publication No. 2007-122.
- NSC (2005). National Safety Council Data. [On Line]. Available: https://www.nsc.org/resources/library/report_table_1.aspx
- OSHA (2007). Occupational Safety and Health Administration Data. [On Line]. Available: [http://www.osha.gov/pls/oshaweb/searchresults.category?p_title=&p_text="+PPE](http://www.osha.gov/pls/oshaweb/searchresults.category?p_title=&p_text=)
- The Eastman Kodak Company (2004). *Kodak's Ergonomic Design for People at Work* (2nd Ed.). John Wiley & Sons, Inc., New Jersey.
- U.S. Bureau of Labor Statistics (2005). Bureau of Labor Statistics Data. [On Line]. Available: <http://www.bls.gov/>