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A Review Paper on Evaluation of OSHA Fall Protection Norms in Indian Scenario

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Abstract

In India, largest segment of workforce belongs to unorganized sector. The construction industry is the most versatile segment of unorganized labor and the safety management is the major issue. This paper conclude the statistics & the major causes of accident in construction industry, safety hierarchy and the design of Horizontal life line by using Energy Balance Method.

Keywords Fall from Height, Fatal Four, Safety Harness, Safety Hierarchy

1. Introduction

In India, the Industry sector contributes maximum in Gross Value Added (GVA) i.e. 29.02% in 2016-2017 after service sector. The construction industry is the second largest sub part of industry sector and the contribution of construction industry in GVA is 7.74% in 2016-17. The construction industry is the most unsafe; the rate of fatal accident in the industry is 4 to 5 times of manufacturing sector (Nair, 2014). In metropolitan cities health and safety issues are comparatively higher than other cities, verity behind this is construction of multistory and tall buildings remain essential in context to serve high demand of housing and infra-structure.

Occupational safety and health Administration (OSHA) defines the major causes of fatalities are fall from height, struck by object, electrocutions and caught in between, these fatal four are responsible for 64.2% of all construction work fatalities in 2015. In India 32% accident causes due to fall from height in large construction industry. The measure causes of fall from height are irregularities & lack of skill, fitness problem in worker and failure of Personal protective equipment. For preventing fall from height OSHA gives preventive measures i.e. personal fall arrest, guardrails, safety net etc. However, results are very apathetic and the important reason behind this is the safety issues are not taken seriously by higher authorities. For providing more safety from fall from height evaluations of following aspects are very necessary:

•Evaluation of load which is required to carry by personal fall arrest system in Indian scenario.

•Evaluation of other fall protective measures which is implemented on site.

Evaluation of protective and preventive measures is very necessary, due to the fact is all measures designed by OSHA follows the American scenario but in India the phy-sique and skills of worker is slightly different and little bit of difference in construction techniques from America.

2. Methodology

The all literature was searched from authentic journals and conferences from the online library database Integral University Lucknow, science direct, Taylor & Francis, Construction Management and Economics and various other relevant sources. In starting, generally web searched is done by using some common keywords like “Construction Safety”, “Fall from Height”, “Personal Fall Arrest”, “Horizontal life line”, “OSHA Fatal Four”, “Safety Issues”, “Harness Design” etc.

After detailed search on publications regarding safety of workers in construction industry, the selection criteria of paper is identified to meet the topic or purpose of this paper.

3. Literature review

In construction industry, increase in complexity of operation the industry become dangerous in comparison of their past decades (Shirur and Torgal, 2014). Health and safety acci-dents, poor quality of work and disputes causes time and cost overrun of project (Ahbab, 2012). Due to decentralization and mobility the construction industry is dangerous or hazardous industry (Kumar Mouleeswaran, 2007). The construction sites are hazardous place where worker can be suffering from injuries or illness and sometimes it leaded to the death, these can happened due to electrocution, falling from height, hit by equipment, objects and moving vehicles and the rate of accident is increases when sites are untidy and badly planned (Nair. 2014). K.N. Jha analyses the main cause of accident in construction industry is fall from height constitute 32%. Fall is depends upon personal, environmental and task related factors (Hongwei Hsiao, 2014). Psychological conditions of

workers are also responsible for fall hazard that is long working hours, health disorder, type of work schedule, shift work and bullied at work site are affects the physical and mental conditions of worker (Takahashi, 2017). For minimizing fall hazard, fall protection is required above 3m and all openings on floor. For reducing fatalities, Japan introduces counter measures like providing scaffold sheeting and installation of mid rails, lower bars and other similar structures for preventing from falls between guardrails and other open spaces (Katsutoshi OHDO et al. 2014).

The safety hierarchy for preventing from fall in descending order of their preference is elimination and substitution, passive fall protection, fall restraint, fall arrest and administrative control (Estep et al. 1995). Elimination and substitution refers to minimizing work at height for e.g. prefabricate wall frame horizontally before standing them up (P. Becker et al. 2001), (Brian HW Guo and Yang Miang Goh, 2017); passive fall protection refers to providing guardrails, warning lines, fences for preventing the workers from reaching the point at which the fall occurs; fall restraint and fall arrest refers to protect workers by using personal safety harness, safety nets which reduces the impact of fall and also prevents from major injury (Daniel Woo, 2013) and administrative controls refers to follow the rules and regulations of work and height and warns workers to proceed task with due care (Brian HW Guo and Yang Miang Goh, 2017). While (Iain Cameron et al. 2005) explains safety hierarchy as Prevention is better than protection.

The simple fall arrest system is fixed point anchorage sys-tem and another system is vertical lifeline system in which lanyard is connected with rope grab but the main problem for these system is to responsible for swing fall hazard; for minimizing the swing fall 'horizontal lifeline system' for fall arrest is introduced (Xiaohua, 2003). According to (Greg Small, 2013) categorized the fall arrest systems in two types, system minimizes the slack between user and anchorage (Automatic Length System) and the system do not minimize the slack between user and anchorage (Fixed length System); in the calculation of fall arrest clearance the factors must be considered are Deceleration distance, Harness Stretch, Worker Stretch out, Combined Worker and Harness Stretch, Height of Worker at fall Arrest, Swing fall distance (SFD), Maximum anchorage system deflection and clearance margin. The (Daniel Woo, 2013) reveals that the members of fall arrest systems are anchorage, body support and connections.

The designing of personal fall protecting system from high rise construction is based on the construction site condition, by analysis of existing solution and by brainstorming meetings with the professionals (Haluk Çeçen and Begüm Sertyesilisik, 2013). The (Qiao Wang et al. 2014) reveals the horizontal life line system is designed by using Energy Balance Equation.

4. Conclusion

Regularly increasing the complexity of work, construction of multistory building and involvement of machinery or heavy equipment increases the chances of accident which may lead to the major injury and sometimes death of workers. The detail review observed that the Safety Hierarchy "Prevention is better that protection" but the implementation of preventive as well as protective, both safety norms are very important to improve the safety of construction site and providing psychological safety to the workers. In United States, the government agency such as OSHA is focused on promoting zero injury environments in industries. So, for improvement of safety in Indian construction industries the evaluation of OSHA fall protection norms in Indian Scenario is important.

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