

Review and Analysis on Behaviour Based Safety in Renewable (Wind) Energy Project

Rajendra Singh Gour, Ms. Nisha Kushwaha

Department of Fire and Safety Engineering
Shiv Kumar Singh Institute of Technology and Science
Indore, M.P., India

Abstract- It is projected that in up to 82 per cent of Work-related accidents, workers, Behaviour – in the form of acts or omissions– is a major contributory factor. Such behaviour can lead for many pre-existing factors to come together in a Potential Severe or Lost Time event. There are several reasons why workers engage in at-risk” behaviour at work. Health and safety in the workplace is influenced by a number of factors, from the organisational atmosphere through management attitude and commitment to the nature of the work or task and the personal attributes of the individual. Safety- related behaviour in the workplace can be improved by addressing these major influences. One way to improve safety performance is to introduce a behavioural based safety process that identifies and strengthens safe behavior and reduces unsafe behaviour. Behaviour-based safety is the "application of science of behaviour change to real world safety problems" or "A process that creates a safety partnership between management and employees that continually focuses people's attentions and actions on theirs, and others, daily safety behaviour." Behavioural safety processes are not a „quick fix“ and it is important not to overlook fundamental elements. Organisations should start by concentrating on strategies and systems –assessing and improving management and operational aspects, training, design and so on. First researched in the 1970s in the US, the behaviour-based safety approach emerged in UK organisations in the late 1980s and is now widely used in a variety of sectors in the UK. IOSH has produced this guidance to introduce the background and basic principles of implementing a process which systematically addresses behavioural safety. The methods described are based primarily on observation, intervention and response as ways of changing behaviour.

Keywords- Behaviour Based safety, At-Risk behaviour, Safety Culture.

I. INTRODUCTION

Human conduct can be considered a major constituent of construction incidents uncovered by many workplace safety's literatures. The existence of virtuous safety behaviour also indicates that good safety compliance is being followed. Health and Safety matter cannot be handled effectually with lack of interference of companies with a specific design and pattern of behaviours as vital measures required changing worker's safety behaviours. The work-related, safety and health Act, 1994 are known as a method provided that statutory framework to implement human behaviour to safety obedience by committed high morals of safety and health at work to eliminate work related accidents.

Though, ignorant behaviour and attitude from the companies and employees contribute to increase of issue on behavioural safety noncompliance to OSH necessities such as Work-related Safety and Health Act (OSHA) 1994. In relation to Numerous incidences of non-acquiescence to the provision of act, mutual reasons

agreed by the companies were; not attentive to OSHA 1994, no availability of time for OSH related matters, not sufficient sharing of resources for OSH, OSH is not vital and “incidents and accidents Will not happen to me” syndrome.

As for the workers, their non-compliance was motives such as; not attentive of safety and health rule, OSH Guidelines and directive are hard to follow, sense of uneasiness when obeying with OSH rules and directive and “accidents would not happen”.

1. Aim:

- To study the workmen behaviour of different activities in construction site using checklist
- Change of management level behaviour by questionnaire methodology.
- To attain Development & change of work culture in hallmark emerald construction project.

2. Scope:

This work is applicable to Rameez Engineering, Kerela for changing the safety behaviour within the organization.

- Significant reductions in incident rates and associated Cost.
- Enhanced attainment of accountability for safety.
- Better understanding of the relationship between safe behaviour and accidents.
- Improved level of safety performance.
- Enhancements in co-operation, participation and communication between organization and staff.
- On-going developments to safety and health systems.

3. About the Company:

Rameez Engineering Company Pvt. Ltd. is established in 1989. Their head office situated in Kallampara facing to Chaliyar river on the way of Feroke- Kadalundy Road, 14 Km distance from Calicut town. Calicut international airport is very near to us, distance about 20 Km. Our nearest Railway station is Feroke, distance about 4 Km.

Chairman cum Managing director is Mr. Majeed. They have successfully carried out of fabrication, to assembly and also Formation, erection of number of prestigious projects of wind Turbine generators, cement, Thermal power, MDF, Alumina, digester rooms, ISRO (Mobile service tower), atomic energy, oil refinery, Cryogenic tanks, tanks and vessels, piping etc. with commissioning in various places.

We have got a full fleet of experts and experienced technicians of Mill wright fitters, fabricators, fitters for pipes and structures, qualified welders for IBR, 6G, 6GR and all position of welders to meet international requirements.

Our riggers are much trained to perform their works at any height even in mountainous terrarium. We have carried out wind turbine generators in Srilanka.

We have successfully commissioned more than 2500 WTG in various places. They have commissioned 1MW of WTG (wind turbine generator system) in Supa, Ahmednagar, and Maharashtra, India. It was first in Asia.

4. Highlights:

- Rameez have carried out wind turbine generators in Srilanka. We have successfully commissioned more than 2500 WTG in various places.
- Their riggers are much trained to perform their works at any height even in mountainous terrarium
- Rameez have commissioned 1MW of WTG in Supa, Ahmednagar, and Maharashtra, India. It was first in Asia.
- Rameez Engineering Company Pvt. Ltd. has successfully carried out of fabrication, Formation and assembly of number of prestigious projects of wind Turbine generators, cement, sugar, fertiliser, thermal power, MDF, Alumina, digester rooms, ISRO(Mobile service tower), atomic energy, oil refinery, Cryogenic tanks, tanks and vessels, piping etc

II. PROJECT BACKGROUND

Renewable Energy to stock, fix and commissioning of 121 nos. of its 2.7 MW model having rotor diameter of 132 m turbines totalling of 327 MW wind powers which is almost equal to 250,000 houses getting power in India. This project is One of India's single scale largest wind power project given to date to install and commissioning of 121 sets of its 2.7 MW model having rotor diameter of 132 m in on shore wind turbines, accumulating 327 MW, to be installed at Pritam Nagar village near satruna in wind farm in Ratlam district in Madhya Pradesh, India

This project was won by customer in SECI VI auction which was part of Solar Enery Corporation of India and it will generate energy which can feed to demands of approx. 250,000 households in India.

III. WASTE GENERATION POLICY

Waste produced throughout the project is in customer scope for final disposal, categorised as different (organic, inorganic). After each turbine erection waste will be collected after housekeeping and handed over to customer. For various work locations to reduce daily use plastic team is using steel lunch boxes. Hazardous waste generated if in case will be handed over to MPPCB approved vendors. Consent is not required to take as the project comes under white category.

IV. RESULT AND SIMULATION

1. Observation and Recommendations:

1.1 General behavior of the person:

- Attention should be grabbed by the workers during Tool Box Talk & Safety pledge.
- No use of mobile during working hours.
- Spitting, smoking occurs constantly at workplaces. Security should be tightened at the gates.
- Dropping of material from heights should be controlled by proper material handling techniques.

1.2 Use of Personal Protective Equipment (namely Safety shoe, helmet, full body safety harness and any other PPE required for the job):

- Supervisors are responsible whether the work men wears helmet adequately tightened and chin-strap should be mandatorily wear by the workmen.
- Workmen never wear hand gloves during concreting work. Working with hand gloves should be made mandatory by the management.
- Worn out PPE must be replaced as soon as possible.

1.3 While manual material handling:

- Carrying of excessive load manually should be avoided.

- Support from co-worker to lift heavier material is required if the worker is carrying above the exceeding limits.

1.4 While ascending or descending on ladder:

- Call for help to co-workers if ladder condition is ok but requires support to secure it.
- Carrying of load by hand or in pocket should be avoided and materials pouches need to be carried by the workmen.

1.5 While using the stair ways:

- Casual steps like taking 2 steps while ascending and descending must be avoided.

1.6 While moving towards the place of work:

- Does not engage in casual chit-chatting with co-workers.
- Warns co-workers if engaged in unsafe act/ At Risk Behaviour.

1.7 While planning for Concreting (Inspection of tools like vibrating before pouring, concreting pipe line):

- Checks the Method statement/ Work Instruction for adequacy and discussing with the supervisor if there is any change.
- Workmen have to watch on activities around him to avoid any unsafe act/condition.

1.8 While concreting on the edge of the structure/near openings:

- He must actively Participate in correcting the unsafe condition by securing the open edges and sets example for others to follow.
- Support of co-worker for lifting heavy loads is required.

1.9 Before calling off the day:

- Materials like nails/ tools/ drawing/ PPE's and storing it in the right place (cupboard/rack).
- Workmen should actively involve in reporting near miss and incidents to the supervisor/ concerned engineers.

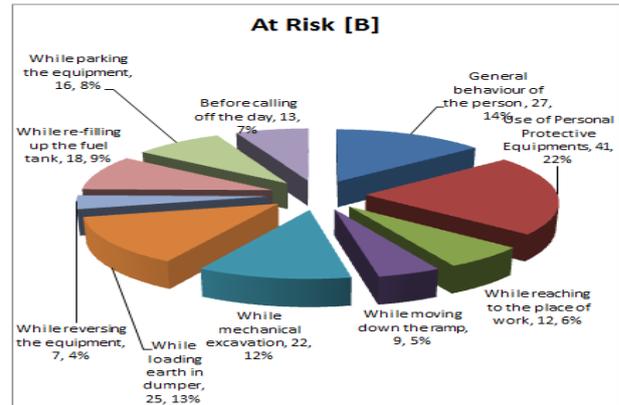


Fig 1. Behavioural Observations for the workmen-Installation Team.

2. Observation and Recommendations:

2.1 General behavior of the person:

- Attention should be grabbed by the workers during Tool Box Talk & Safety pledge.
- No use of mobile during working hours.
- Spitting, smoking occurs constantly at workplaces. Security should be tightened at the gates.
- Dropping of material from heights should be controlled by proper material handling techniques.

2.2 Use of Personal Protective Equipment (namely Safety shoe, helmet, full body safety harness and any other PPE required for the job):

- Supervisors are responsible whether the work men wears helmet adequately tightened and chin-strap should be mandatorily wear by the workmen.
- Workmen never wear hand gloves during concreting work. Working with hand gloves should be made mandatory by the management.
- Worn out PPE must be replaced as soon as possible.

2.3 While manual material handling

- Carries tools in a properly secured waist pouch/ backpack.
- Inspects the load before lifting it.
- Asks support of co-worker to lift heavier material.

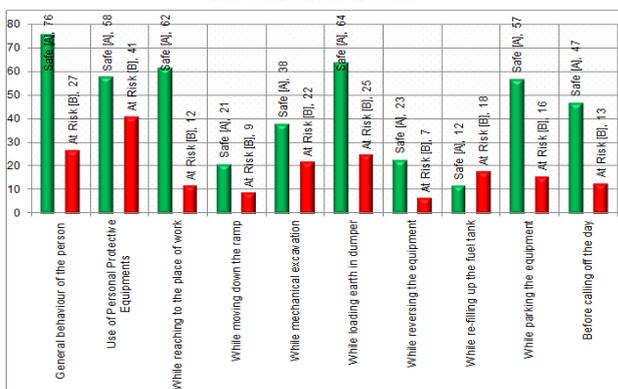
2.4 While ascending or descending on ladder:

- Call for help to co-workers if ladder condition is ok but requires support to secure it.
- Carrying of load by hand or in pocket should be avoided and materials pouches need to be carried by the workmen.
- 80% of the workers never maintains 3point contact (2hand+1foot/2foot+1hand in contact with the ladder rung/guard rail) while using a ladder.

2.5 While using the stair ways:

- Workmen should Maintain 3 point contact (2 hand+1foot/ 2foot+1 hand in contact with the guard rail)
- Should not take casual steps (2 at a time)

Behavioural Observations for the Workmen-Installation Team



2.6 While moving towards the place of work:

- Does not engage in casual chit-chatting with co-workers.
- Warns co-workers if engaged in unsafe act/ At Risk Behaviour.

2.7 While planning for fitment of shutters (pre-inspection, match-marking and stacking):

- Avoid excessive bending. (Ergonomics)
- Stacking the materials & shutters during work and after work has to be improved.

2.8 While fitting the shutters on the edge of the structure /near openings;

- Workmen are not highlighting if there is any non-conformity in the edge barrication to his supervisor.
- Avoids excessive bending above waist level to reach out to job.
- Use of adequate lightning arrangement by co-ordinating with authorized electrician/supervisors.

2.9 Before calling off the day:

- Workmen should other required house keeping, once the job for the day is done. He must collect balance material like nails/tools/drawing/PPE and storing it in the right place.
- Stacks ply should be attacked in an orderly manner.

3. Observation and Recommendations:

3.1 General behavior of the equipment operator:

- Lacking of checking the equipment before the operation (Protective shield on wind shield, Horn, brakes, reverse light, reverse siren, adjusts seat height, adjusts the side mirror, checks the bucket locking pin, hydraulic oil pressure, battery, fuel level and tyre pressure).
- No spitting activities while at work.

3.2 Use of Personal Protective Equipment (namely Safety shoe, helmet, fullbody safety harness and any other PPE required for the job)

- Equipment operator at times fails to wear helmets during the time of vehicle operation. Use of helmet secured by adequately tightening the ratchet and chin-strap should be worn mandatory.
- Use earplug/ear muff while breaking operation.

3.3 While loading earth in dumper:

- Quick job contractors make a practice of not evening out the load on the dumper by spreading the earth, which should be avoided.
- The unloaded excavated earth must be 1.5 meters away from the edge of the excavation.

3.4 While re-filling up the fuel tank:

- Makes use of hand pump and pipe to re-fill the fuel tank.
- Avoids unsafe practice of placing the diesel drum in the bucket and raising the bucket above the height of fuel tank.

3.5 While parking the equipment:

- Workmen engaging parking the vehicle within 2 meter premises which be avoided. He should Park the equipment at least 2 meters away from the edge of the excavated pit.

3.6 Before calling off the day:

- Lot of workmen fails to inform the shift supervisor about any untoward incident and probable hazard immediately after observation. This culture has to be changed.

Behavioural Observations for the Workmen-Mechanical Completion:

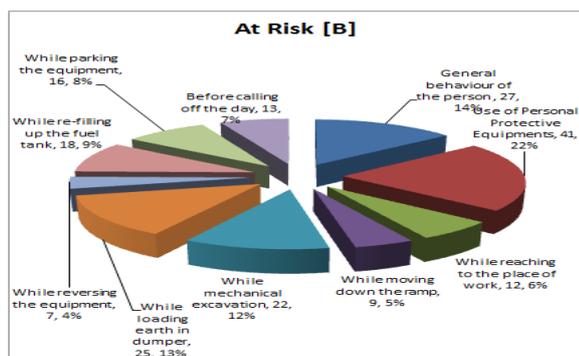
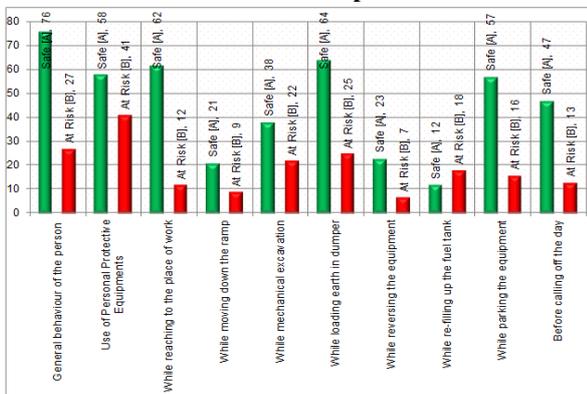
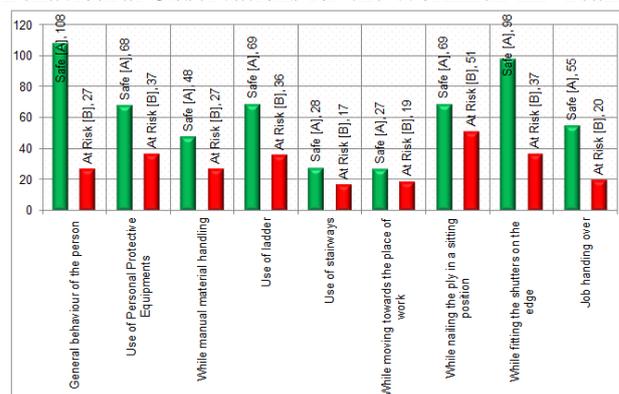


Fig 2 Behavioural Observations for the workmen-Mechanical Completion.

Behavioural Observations for the Workmen-IIP Team



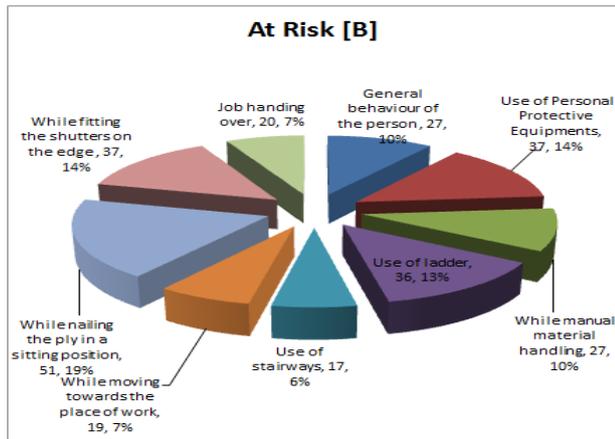


Fig 3. Behavioural Observations for the workmen-IIP Team.

V. CONCLUSION

The fundamental objective has been to understand the Behaviour observations & corrective actions among workmen and employee's in various stages of a project. It had taught me the enhanced adaption of accountability for safety. The project of Hallmark Emerald made me focusing on better understanding of the relationship between safe behavior and accidents also tries to identify the hazards & risks associated in different areas.

It has also supported me a lot to know the diverse challenges encountered by the EHS Department during the course of the entire project tenure. The Project benefits in the aspect that has equipped me with suitable knowledge about the functions of EHS during the phases of the project. This Project was like wise great to figure out what my qualities and short coming sare. This helped me to characterize ewhat abilities and information I need to enhance in the impending time.

REFERENCES

- [1] ISO 45001:2018 Standard.
- [2] Behavioural based safety checklist for different activities.
- [3] http://www.hsa.ie/eng/Publications_and_Forms/Publications/Safety_and_Health_Management/behaviour_based_safety_guide.pdf.
- [4] Googleforms online survey methodology https://docs.google.com/forms/d/1kbZP3ufkQMSV_s5Mu-KS8Px1Xta-hXCFxs6lU_i8ldw/viewform?c=0&w=1
- [5] Abang Abdullah, D.N.M., Murshid, M. N., & Lim Omar, S.(2005). A theory on the Vitality of Behaviours-Based Safety (BBS) in Creationan Company's asafe work area. Proceeding of 8th Exhibition NIOSH, 131-140.
- [6] Bakshi, A., Kumar, K., Rani, Ekta. (2009). Organisational Justice Perceptions as Predictor of Job Satisfaction and Organisation Commitment. Journal

of International Business and Management, 4(9), 145-154.

- [7] Bhattacharjee, S., Gosh, S. (2011). Safety Enhancement Methods in the Construction Industry: A Evaluation and Future Directions, Proceeding of 47th ASC Annual International Conference.
- [8] Ismail, F., Hashim, A.E., Salimin, R.H., Mahmood, M.A. (2010) Behaviour Based Safety Method: A Mechanism for Workplace.