

# Behaviour based safety management system to minimise health and safety risk at cement plants

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## Abstract

Health & Safety of employees as well as business partners is main focus area of any manufacturing organization nowadays because any harm can destroy brand image of organization. There is huge amount of direct & indirect cost involved for any accident.

In reputed established Indian cement companies health and safety responsibilities lies with top management and safety professional are working as advisors to guide them to achieve excellence. Apart from physical hazard control & bringing them to as low as reasonably practicable, driving through behavior based safety is a recent practice in Indian cement plants.

This module uses positive motivational forces to change behavior of workers to reduce & effectively control work related injuries. Through this module employees and business partners can be involved in prevention programs, so they can better understand their responsibilities toward health and safety. In view of the present Industrial scenario it is recommended to include safety engineering as compulsory subject in every engineering & technology curriculum.

**Key words-** *Behavior based safety, cement, occupational health and safety.*

## 1. Introduction

Behavioral-based safety is a term used to describe the prevention from ill health, accidents, injuries and loss in the workplace. Effectiveness of this program relies on engagement to finally understand unsafe behaviors with a focus to convert them in to safe behaviors. This paper describes about behavior-based safety program in cement plants.

Reduction in workplace injuries and occupational illness will directly improve manufacturing standards & plants is considered in some leading

cement manufacturing plants.

Various type of motivational programs are helping to promote good culture towards occupational health, safety and environment in some Indian cement plants. Behavior based safety is came up with positive reinforcement on worker's behavior. This behavior based safety module uses positive motivational forces to change unsafe behavior of employees and business partners towards safe behavior. Through behavior based safety program workers and employees can be involved in injury prevention programs so that they can resume more responsibilities towards health and safety management system. Moreover in this system objectives and aims are better explained to all employees and business partners. For its successful implementation management commitment, involvement of line managers and trustworthy culture is required.

### 1.1 Importance of effective communication in bbs module

Effective communication plays a great role to influence and change unsafe identified behavior of employee and stakeholders. It is already proved through various research studies that open and healthy communication results in change of mind set and unsafe behaviors into safe behavior. Transparency is utmost required during any communication to share any EHS results and trends to involve all workers and employees.

Following questions can be asked to understand safety communication and training:-

. Whether employee's performance is at par with the company's health and safety plan.

. Is there any employee communication program

existing.

Is this program involves all stake holders.

## 1.2 Advantages Of Behaviour Based Safety Program

- Improved moral and confidence level of employee and stakeholders
- Good brand image of the organization.
- Positive motivation, which results into positive learning's .
- Improved compliance of statutory norms relate to health and safety management system.
- Reduced trend of injuries and occupational illness.
- Improved trend of workers presence, hence improved productivity.
- Saving of medical expenditure which results from illness and injuries.

## 1.3 Behaviour based safety module-Learning Objectives

- Apply the five behaviors to any work or home activity they may be doing to prevent injuries
- Understand the difference between other safety management tools and five Behaviors.
- Understand some incidents will not be related back to five behaviors.
- How to differentiate five behaviors from rule/procedure based Behavioral breaches (disciplinary process).
- Identify and act on warning signals that may lead to inappropriate behaviors that can lead to an injury.
- Know when and how to focus on specific activities to prevent injuries.
- Promote and positive examples only of five behaviors.

## 1.4 Constituents Of Behaviour Based Safety Module

By changing behaviors of employees & business

partners unsafe behaviors can be converted into safe behaviors. It is a continuous process where reinforcement and motivation gradually applied till change into positive responses. Shaping is a technique used in plants where behavior based safety module is used. In shaping technique continual positive motivational forces are applied to change mind set & rigidity. After certain period of time workers learn how to perform any job safely and feel responsibility of safety in their jobs results in reduced occupational illness and work related injuries. Hence management feels sharing of health and safety responsibilities with all stake holders and all employees. This methodology improves collaboration & team management and workers easily find out the unsafe behaviors.

After identification of unsafe behaviors shaping methods can be applied to change it.

Following steps are used in shaping method-

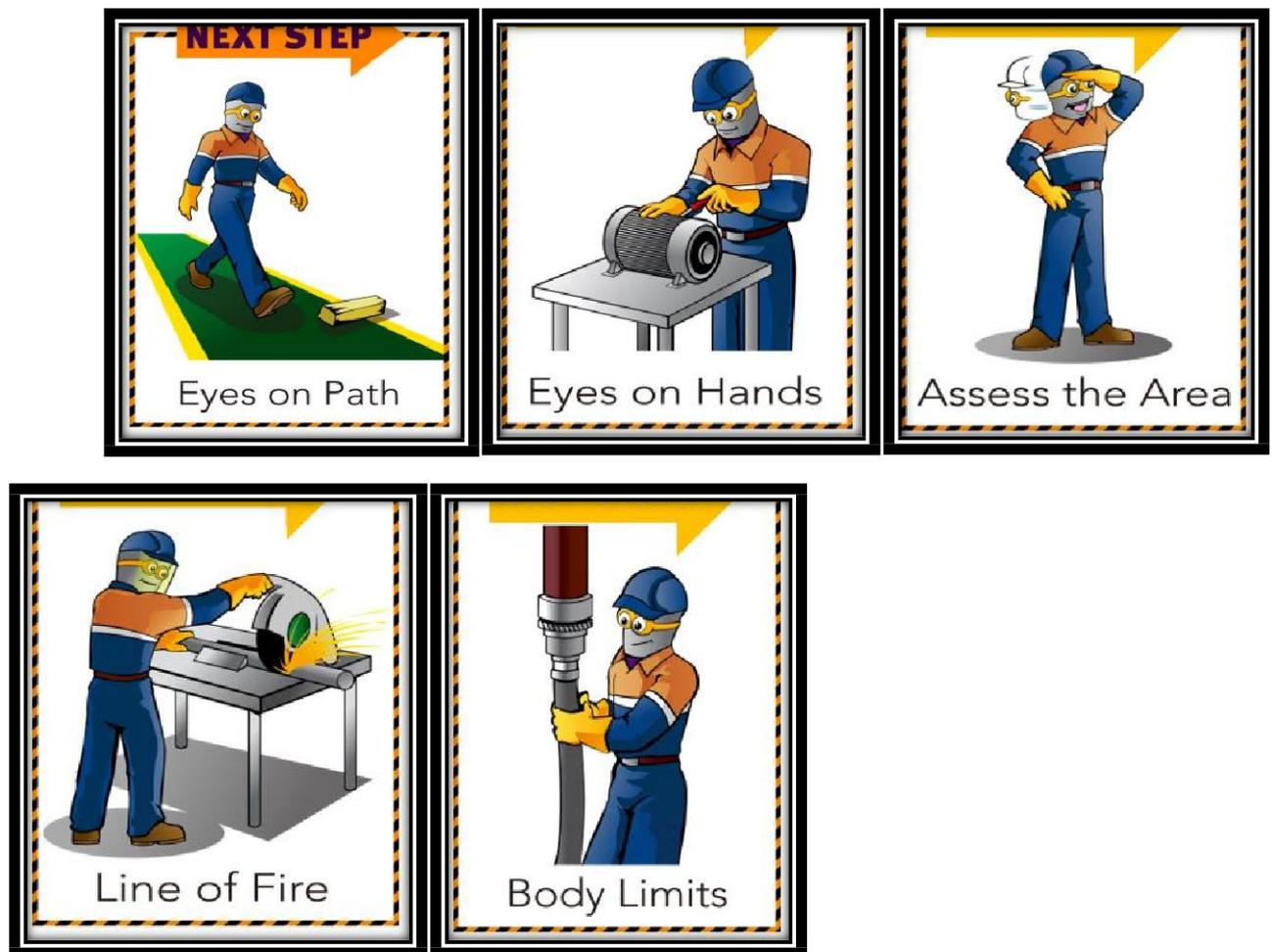
- Identify the specific change in behavior that is desired
- Agreement from worker to change unsafe behavior.
- Action plan to be established to change behavior.
- Continue workers behavior to be observed.
- Motivate & reinforce the worker's positive behavior.

## 1.5 Major Steps Of Behaviour Based Safety Module:

1. Eyes on path means focus on pathways avoid use of mobile phones.
2. Eyes on hands means focus on your job to avoid mental distractions.
3. Assess the working area means always perform any job with prior risk assessment.
4. Away from line of fire means follow segregated pathways way from movement.
5. Body limits means follow ergonomics.

## 1.6 Pictorial Representation Of Five Behaviour

Below mentioned five behavior program is well implemented in reputed Indian cement companies and these plants achieved maximum benefits of it.



**Figure 1** ( Representation Of Five Behaviour through pictures)

1. Eyes on Path: -Means one must be attentive while walking.
2. Eyes on Hands:-While working one must focus towards his hands to avoid any Injury.
3. Assess th earea: -Hazard Identificatio and risk assessment is compulsory befor any job.
4. Line of fire:-One must remain out of the line of hazards and risk.
5. Body Limits:-Its means bodyergonomic must be adhered to.

**2. Review Of Litratuure**

Abdul Rahim ,Muhd and S.Bachan,2008 in their journal “Causes Of Accidents at construction site

Described about importance of BBS module in converting unsafe behavior in to safe behavior.

D.M.Dejoy, 2005 also reported reduction in injuries in their study “behavior change versus culture change: divergent approach to managing workplace safety. D.Cruthirds abd S.Pittman ,1996 described about systematic approach to BBS program in their study “behavior based safety process”. Geller,S.E.,2001 also focused on Industrial scope of BBS process in their study” Behavior based safety in Industry”. M.D.Cooper ,2009 in his study “ Behavior safety “A review of process design factors “ described and co-related this aspects with other factors .Where as T.A.Smith ,1999 in his study “What wrong with behavior based safety” focused on right way and correct systematic approach of BBS ti achieve desired results.

**3. Material And Method:**

Fort his objective experiment and control groups were selected on random basis and performance feed back of workers about unsafe behaviors reviewed.

Ten workers were selected as a control group and ten workers experimental group. Implementation of this program includes training for workers .Experimental group was trained for five days for safety issues using various methods.Major behavior based-safety programs in general were composed of three parts: preparation of checklist of critical behaviors, observations and feedback .To prepare check list critical incidents reports, interviews with workers, brains to storming is useful. Determine the percentage of safe behavior is away to get behaviors that more attention is needed.Check list based on observations obtained recorded behaviors and provide required feedback to workers. Feedback reinforces the necessity of safe behaviors.Critical behaviors is listed in Table.By adding up all the safe observations for a particular behavior and dividing this sum by the total number of observations for this behavior, measuring percent safe score for each target behavior and multiplying this number by100 yield percent safe score for a particular behavior.

These observation taken three times a day :morning, afternoon and toward the last hour of work.The observations implemented daily.The control group continued to work without any intervention.Total 354 observations for different groups in the testing phase for all three groups were conducted.During the experimental phase observations done for five days a week. Feedback

for experimental group during the test toward safety behaviors was conducted and control group without received intervention and of course continued its work.

Behaviors variables	Safe	At Risk	Remarks
Always follow pedestrian path or pedestrian Demarcations while walking.			
Useoffull body safety harness while working at Height.			
Do not climb on any ladder without use of three point contact.			
Climbing the unstable or damaged sheets should be refused			
Do not throw the bolt from top to bottomand vice versa.			

Table 1 Behiour observation table

**3. 1 Implementation**

Availability and review of existing health and safety implementation plan is a prerequisite of behavior based safety module implementation. Identification of strength, weakness, opportunities and threats are also essential.Define role sand responsibilities under behavior based safety modules among the different are as of plant and appoint area representatives. Ownership of management and all stakeholders needs to be defined clearly

**4 Result And Discussion**

The mean scores of the safety performance for both experimental and controlgroups before treatment step, based on the safety of all workers in the site were derived. Safety performance indicators for experimental and control groups are shownin Fig.A scan be seen in the figure2.Safety performance index of the experimental group during the 9 weeks of intervention has changed from 66% to 92% .After 9 weeks of measurement and feedback assessment of influences of behavior-based safety in the experimental group,the trend continued for more two months.While this stage,observations were performed to assess behaviors.As can be seen in Fig.2,actions have been somewhat effective.

Table 2 ( Table showing week wise safety Index)

Week	1	2	3	4	5	6	7	8	9
Safety Index- Control Group	65	66	67	69	69	65	69	66	67
Safety Index- Experimental Group	66	67	70	71	73	79	80	87	97



Fig. 2. Mean safety performance index for the experimental and control groups

Table 3( Table showing safety Index of experimental group)

Safety Index	1	2	3	4	5	6	7	8	9	10	11
Experimental Group	66	67	70	71	73	79	80	87	97	97	99

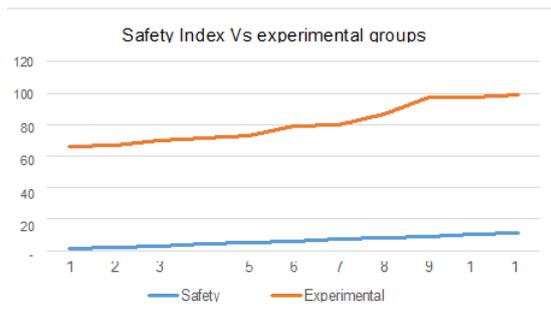


Fig. 3. Mean safety performance index of three phases of study for the experimental group

## 5. Conclusion

Over all purpose of this study was the application of behavior-based safety among cement plant workers to change unsafe behaviors to safe behaviors. The tremendous improvements in safety performance of companies who have implemented BBS process have successfully achieved. The behavior-based safety approach always targets specific behaviors to evaluate and then attempts support, increase, or decreases them. Workers in

the selected cement plants have gained more information about job health and safety and get specific trainings; therefore their attitudes changes towards safe thinking. So the important function so the behavior-based safety resulted in first, introduction of safe behaviors of workers and second change workers attitude. Behavior based safety involves the practical application of safety procedures based on the real world behaviors of employees in work situations. Everyone is considered responsible not only for their own safety, but

for the safety of others. Identifying common workplace safety issues enables a company to assess the problem areas and create behavioral-based safety guidelines. All and all, implementing behavioral-based safety practices in the workplace ensure a protected environment and employees are prompted to work together as a team to help monitor and diminish occurrences of hazardous events. Encouraging employees to be proactive in both planning safe work settings and watching the habits of co-workers creates a sense of continuity and loyalty.

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